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Leaf-rolling Sawflies of the *Pamphilius komonensis* Complex (Insecta, Hymenoptera, Pamphiliidae)

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Abstract *Pamphilius komonensis* complex of species is represented by seven East Asian species: *P. komonensis* Takeuchi, 1930, and *P. takeuchii* Beneš, 1972 [=*P. jucundus* Takeuchi, 1930 (not Eversmann, 1847)] from Japan, *P. croceus* Shinohara, 1986, and *P. kyutekparki* Shinohara, 1991, from Primorskij kraj and Korea, *P. nitidiceps* Shinohara, 1998, and *P. uniformis* sp. nov. from central China (Shaanxi), and *P. politiceps* Shinohara & Yuan, 2004, from southern China (Guangxi). A new species, *P. uniformis*, is described and illustrated. Each species is diagnosed and illustrated and keys are given to separate the females and males of the seven species, except for the still unknown male of *P. politiceps*. Relationships of the seven species are discussed with reference to their distributional ranges.

Key words: Hymenoptera, Pamphiliidae, *Pamphilius komonensis* complex, new species, phylogeny.

Introduction

The *Pamphilius komonensis* complex of species is a small group of leaf-rolling sawflies occurring in eastern Asia. It was first proposed by Shinohara (1991) as a subgroup of the *P. alternans* group for four species, *P. komonensis* Takeuchi, 1930, and *P. takeuchii* Beneš, 1972, from Japan, and *P. croceus* Shinohara, 1986, and *P. kyutekparki* Shinohara, 1991, from Primorskij kraj and Korea. Shinohara (1991) gave all the information then available about the two species known from the mainland of Asia but did not offer detailed account on the two Japanese species. Shinohara (1998a) described an additional species, *P. nitidiceps* Shinohara, 1998, from Shaanxi, China and Shinohara (2002) gave a concise account of the species groups of *Pamphilius* including the *P. alternans* group and *P. komonensis* subgroup (complex). Recently, Shinohara & Yuan (2004) described *Pamphilius politiceps* Shinohara & Yuan, 2004, from Guangxi, China. The *P. komonensis* complex thus comprises six species in eastern Asia so far, two Chinese species known only by one female each.

The present paper is a full systematic account of the component species of the *P. komonensis* complex based on all the currently available material. Seven species are recognized in the *P. komonensis* complex, including a new species from Shaanxi, China.

Materials and methods

This work is based on the examination of over 2,600 specimens housed in the following collections (curators or owners in parentheses):

EU: Ehime University, Matsuyama [N. Ohbayashi, M. Sakai]

EWU: Natural History Museum, Ewha Womans University, Seoul [B.-J. Rho]

HKC: H. Kumamoto Collection, Hirakata

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HNC: H. Nagase Collection, Kamakura
HSC: H. Suda Collection, Sakura
HU: Hokkaido University, Sapporo [M. Suwa]
HYC: H. Yoshida Collection, Osaka
IZB: Institute of Zoology, Chinese Academy of Sciences, Beijing [D.-c. Yuan]
KNU: Kangwon National University, Chuncheon [K.-T. Park]
KSU: Kagoshima University, Kagoshima [K. Kushigemachi]
KU: Kobe University, Kobe [T. Naito]
MNHAH: Museum of Nature and Human Activities, Hyogo, Sanda [A. Nakanishi]
MU: Zoological Museum, Moscow State University, Moscow [A. V. Antropov]
MYC: M. Yamada Collection, Hirosaki
NIAES: National Institute of Agro-Environmental Sciences, Tsukuba [K. Yasuda]
NRS: Swedish Museum of Natural History, Stockholm [B. Viklund]
NSMT: National Science Museum, Tokyo [A. Shinohara]
OMNH: Osaka Museum of Natural History, Osaka [R. Matsumoto]
OPU: Osaka Prefecture University, Sakai [M. Ishii, T. Hirowatari]
SNU: Seoul National University, Suweon [K.-S. Woo]
TKC: T. Kondo Collection, Kurashiki
YUK: Yeungnam University, Kyongsan [J.-W. Lee]
ZISP: Zoological Institute, Russian Academy of Sciences, St. Petersburg [A. Zinovjev]

Morphological terminology mainly follows Middlekauff (1958) and Shinohara (2002). The terms "mesoscutal median lobe," "mesoscutal lateral lobe," and "pseudosternum" are used instead of "prescutum," "mesoscutum," and "mesobasisternum" of Middlekauff (1958, p. 58).

For examination by SEM, external genitalia of both sexes were removed from the insect after relaxing with moisture, cleaned in 70% ethanol, and air-dried. They were then sputter coated with gold. After SEM observations, they were glued to a small paper and pinned with the insect.

Light microscopy examination was made mainly using an Olympus SZ60. Digital images were taken mainly by using a Keyence VHX-200 Digital HF Microscope. SEM images were taken by using a JEOL JSM-6380LV.

The *Pamphilius komonensis* Complex

The adults of the *P. komonensis* complex are medium-sized to large sawflies (females 8–14.5 mm; males 7–13 mm) characterized as follows (Figs. 1–3): Head generally smooth, without dense or deep surface sculpture. Upper frons moderately convex, sparsely punctate and pilose, or strongly convex, impunctate and glabrous. Facial crest moderately to strongly swollen, often carinate. Postocellar and postocular areas sparsely punctate and pilose or impunctate and glabrous. Antenna with 1st flagellar segment 1.9–3.3 (usually 2.3–2.9)×length of 2nd. Right mandible tridentate (Fig. 4 B, D); left mandible with or without middle tooth (Fig. 4 A, C). Color pattern of females various: head largely black to almost entirely orange (clypeus always light-colored, pale yellow to orange); abdomen with median segments orange, or mostly black (dark specimens of *P. komonensis*, Fig. 2 A–B), or mostly black above and pale yellow below (*P. uniformis*, Fig. 1 G–H). Forewing often with dark cloud in apical 1/3. Legs with femora and tarsi without black marks. Sawsheath peg rather small, slender and pilose (Fig. 10 A–D, F–G), except in *P. uniformis* (Fig. 10 E). Male genitalia: ventral arm of gonostipes with narrow plate-like process along proximal margin, developing inside gonocardo and exceeding its proximal margin (Fig. 12); inner margin of harpe roundly or angularly produced at base; valviceps without dorsolateral process.

The species of the *komonensis* complex may be separated from the other congeners by the combination of the long 1st flagellar segment, the tridentate right mandible, generally smooth head with convex upper frons and facial crests, and entirely pale yellow femora and tarsi. The females of *P. sulphureipes* group (*P. sulphureipes* Kirby, 1882, *P. coreanus* Takeuchi, 1938, *P. zhelochovtsevi* Beneš, 1974, *P. ishikawai* Shinohara,

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1979, and probably *P. shengi* Wei, 1999, which is unknown to me in nature) share the same set of characters, but they are different from those of the *komonensis* complex in their black clypeus (except for *P. zhelochovtsevi*) and black abdomen without orange areas (Shinohara, 1993). The males of the *komonensis* complex are also recognized by the peculiar feature of the genitalia, particularly by the narrow plate-like process along the proximal margin of the ventral arm of the gonostipes, which exceeds the proximal margin of the gonocardo (Fig. 12).

The last mentioned character in the male genitalia is unique to the members of the *komonensis* complex and is regarded as their synapomorphies (Shinohara, 1991, 2002).

Seven eastern Asian species are recognized in this species complex: *P. komonensis* Takeuchi, 1930, and *P. takeuchii* Beneš, 1972 [=*P. jucundus* Takeuchi, 1930 (not Eversmann, 1847)] from Japan, *P. croceus* Shinohara, 1986, and *P. kyutekparki* Shinohara, 1991, from the Russian Far East and Korea, *P. nitidiceps* Shinohara, 1998, and *P. uniformis* sp. nov. from central China (Shaanxi), and *P. politiceps* Shinohara & Yuan, 2004, from southern China (Guangxi).

Host plants are known only for two Japanese species, *P. komonensis* and *P. takeuchii*. Larvae of both of these species feed on the leaves of *Acer mono* Maxim. (Okutani, 1959; Shinohara & Okutani, 1983), singly making a screw-like leaf roll of the type (c) of Chambers (1952) (Shinohara & Hara, 2005). Other species of the *altenans* group for which hosts are known (?*P. alternans* (A. Costa, 1860), *P. aurantiacus* (Giraud, 1857), *P. ignymontiensis* Lacourt, 1973, *P. lethierryi* Konow (1887)) feed on *Acer* spp. (Lorenz & Kraus, 1957; Lacourt, 1995), except for *P. marginatus* (Audinet-Serville, 1823), which feeds on *Carpinus* and *Corylus* (Lorenz & Kraus, 1957). I have swept adult specimens of *P. kyutekparki*, *P. nitidiceps*, and *P. uniformis* from the foliage of *Acer* spp. in Korea and China, likely host plants.

Relationships

Methods

Relationships of the seven species were analyzed using PAUP version 3.1.1 (Swofford, 1993) with default settings. A data matrix of 13 characters listed below (Table 1) was created with the spreadsheet editor of MacClade version 3.03 (Maddison & Maddison, 1992) and then put into analysis with PAUP. The OTUs are the seven species as well as the "outgroup", which is a set of character states regarded as plesiomorphic for the *komonensis* complex considering the character states observed in the other congeners and particularly the other members of the *alternans* group. For the characters 1, 6, and 9–12, plesiomorphic states were not determinable and the code "?" was assigned to the "outgroup". All the characters were equally weighted. An exhaustive search was performed on two sets of data, *unordered* and partly *ordered*. In the data matrix for the *unordered* analysis, all the characters are treated as *unordered*, whereas in the matrix for the partly *ordered* analysis, characters 2–5, 7–8, and 13 are treated as *ordered* because polarity of the transformation of these characters seems to

Table 1. Data matrix used for the analysis. See text for explanation.

characters	1	2	3	4	5	6	7	8	9	10	11	12	13
OTUs													
P. komonensis	0	0	0	0	0	1	0	1	0	2	0	0	0
P. kyutekparki	0	0	0	0	0	1	0	1	0	1	0	0	0
P. nitidiceps	1	1	0	1	1	0	1	0	1	1	0	2	1
P. politiceps	1	1	0	1	?	0	1	0	1	1	0	?	?
P. takeuchii	1	1	1	2	1	0	0	0	1	1	0	1	1
P. croceus	1	1	1	2	1	0	0	1	1	0	1	2	1
P. uniformis	0	1	1	2	1	0	0	0	0	0	1	0	1
OUTGROUP	?	0	0	0	0	?	0	0	?	?	?	?	0

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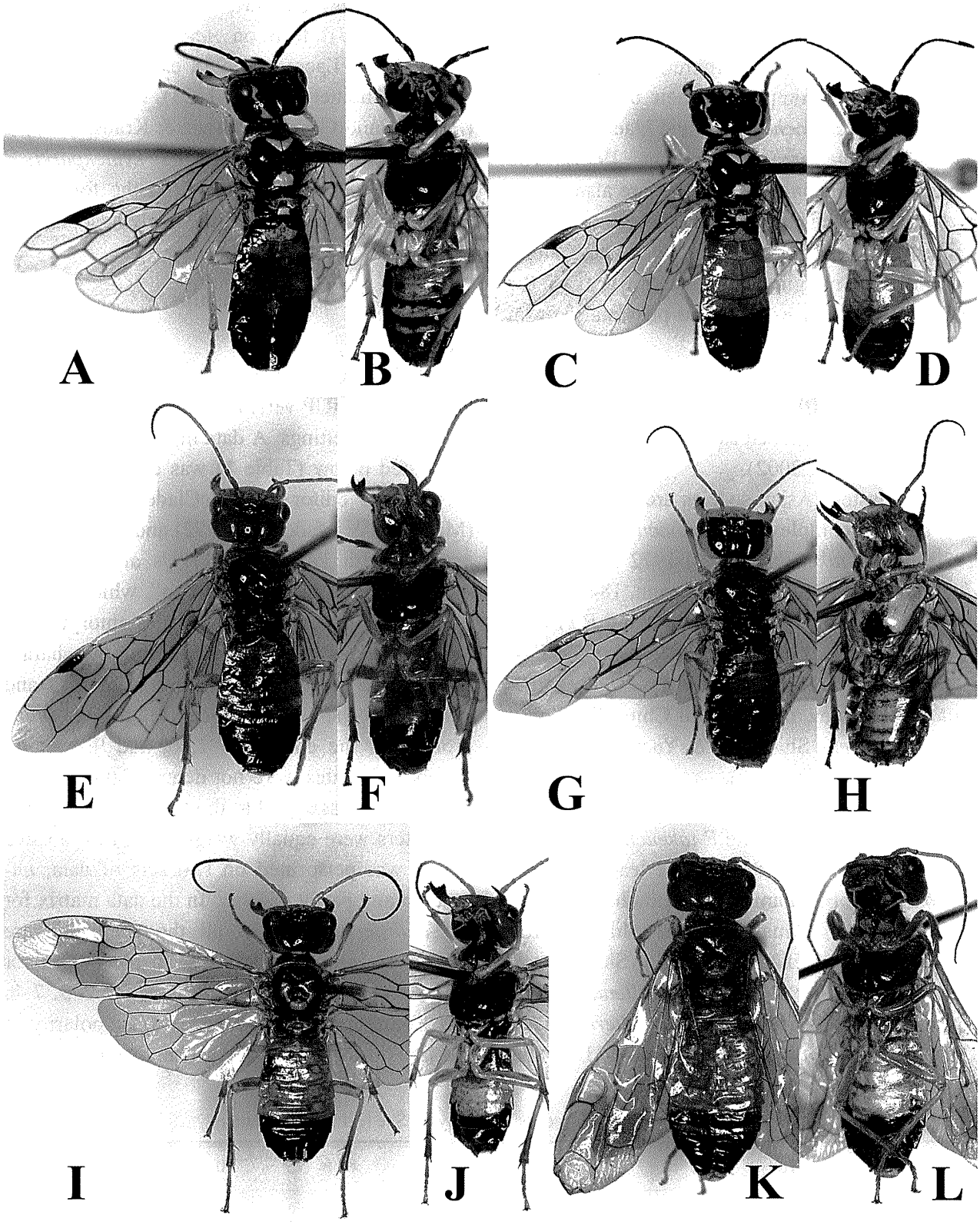

Fig. 1. *Pamphilius* spp., females.—A–B, *P. komonensis*, Shichimi-onsen, Japan; C–D, *P. kyutekparki*, paratype, Mt. Odaesan, Korea; E–F, *P. nitidiceps*, Mt. Taibaishan, Shaanxi, China: G–H, *P. uniformis*, paratype, Mt. Taibaishan, Shaanxi, China; I–J, *P. takeuchii*, Yatsugatake Mts., Japan; K–L, *P. croceus*, Spassk, Russia.

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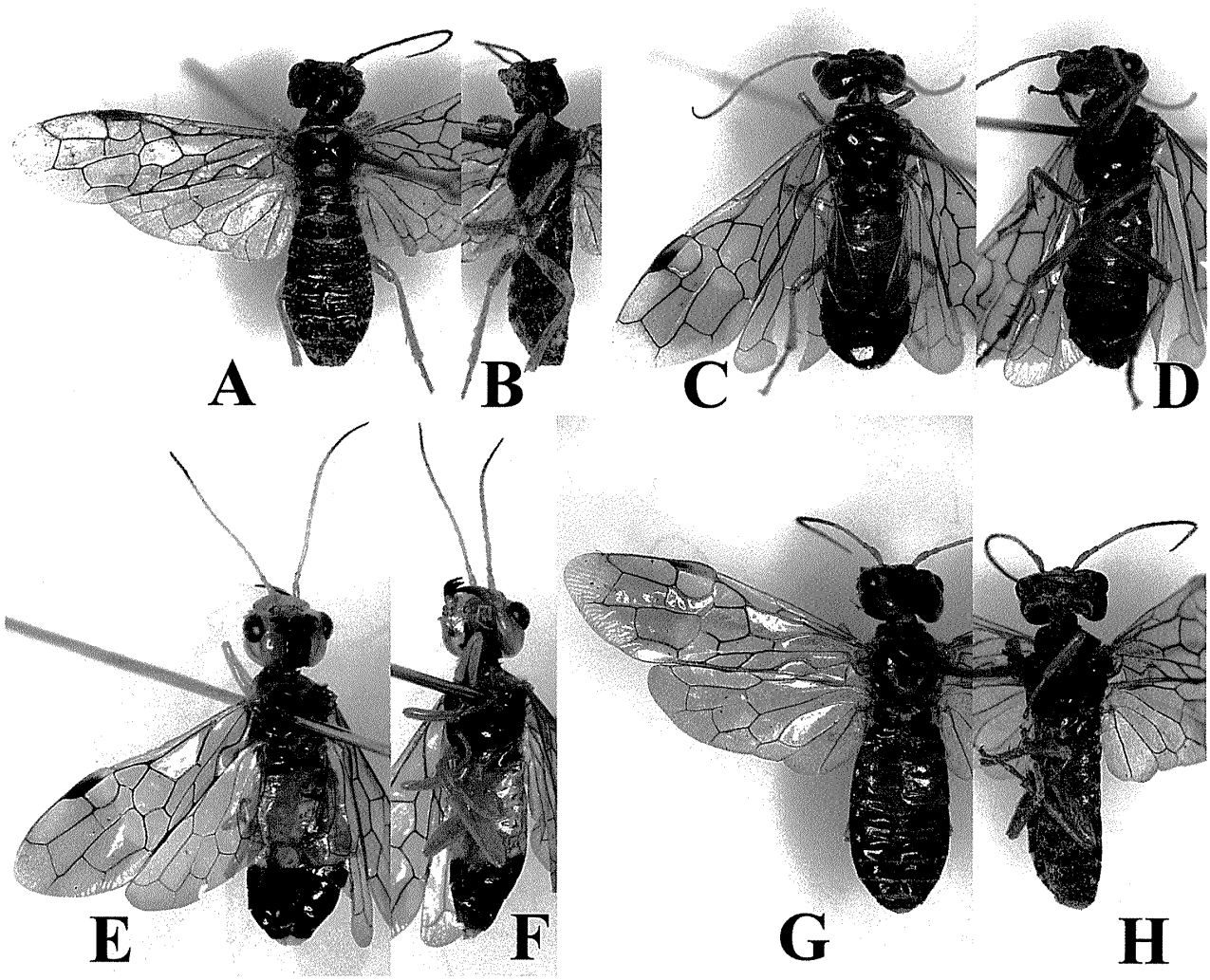

Fig. 2. *Pamphilius* spp., holotypes, females.—— A–B, *P. komonensis*; C–D, *P. nitidiceps*: E–F, *P. politiceps*; G–H, *P. takeuchii*.

be determinable (see below for more details).

Characters used for the analysis

1. Gena in female black (0) (Fig. 1 A–D); mostly or entirely orange to creamy white (1) (Fig. 1 E–L). The genus *Pamphilius* and the *alternans* group include both states (Shinohara, 1991) and "?" is thus assigned to the "outgroup".

2. Upper frons moderately convex and pilose (0) (Fig. 9 B–D); strongly convex and glabrous (1) (Fig. 9 E–F). The state (0) is common in the Pamphiliidae, including all the other species of the *alternans* group. The state (0) is thus assigned to the "outgroup". The strongly convex upper frons in other species groups of *Pamphilius* (e.g., *P. histrio*, *P. sylvaticus*, *P. sulphureipes* groups) should have developed independently (Shinohara, 1991, 1995, 2002).

3. Upper frons in female with very shallow indistinct notch (0); with deep or shallow but sharply defined notch (1). The state (0) or the absence of the notch should be an "outgroup" character condition. The presence of a "groove" on the upper frons in the *alternans* subgroup (Shinohara, 1991) should be different in origin.

4. Facial crest in female low, rounded (0); strongly inflated, rounded, not continuous to ridge on inner orbit (1); strongly inflated, carinate, and continuous to ridge on inner orbit (2). Development of the facial crest, apparently a derived character, is known for several lineages in the Pamphiliinae. Within the *komonensis* com-

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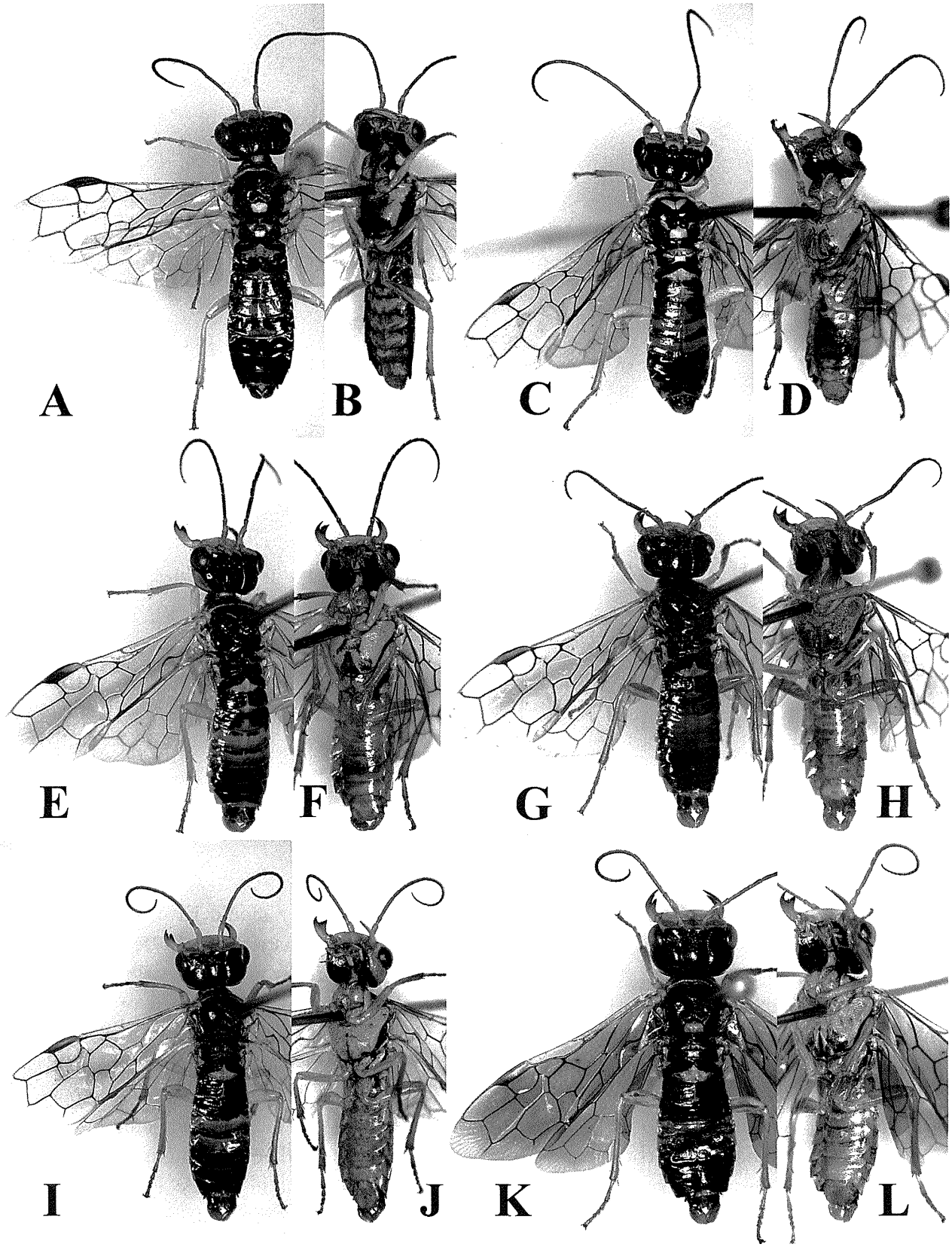

Fig. 3. *Pamphilius* spp., males.—A–B, *P. komonensis*, Mt. Jinbayama, Japan; C–D, *P. kyutekparki*, paratype, Mt. Odaesan, Korea; E–F, *P. nitidiceps*, Mt. Taibaishan, Shaanxi, China: G–H, *P. uniformis*, holotype; I–J, *P. takeuchii*, Nissho-toge, Japan; K–L, *P. croceus*, Mt. Odaesan, Korea.

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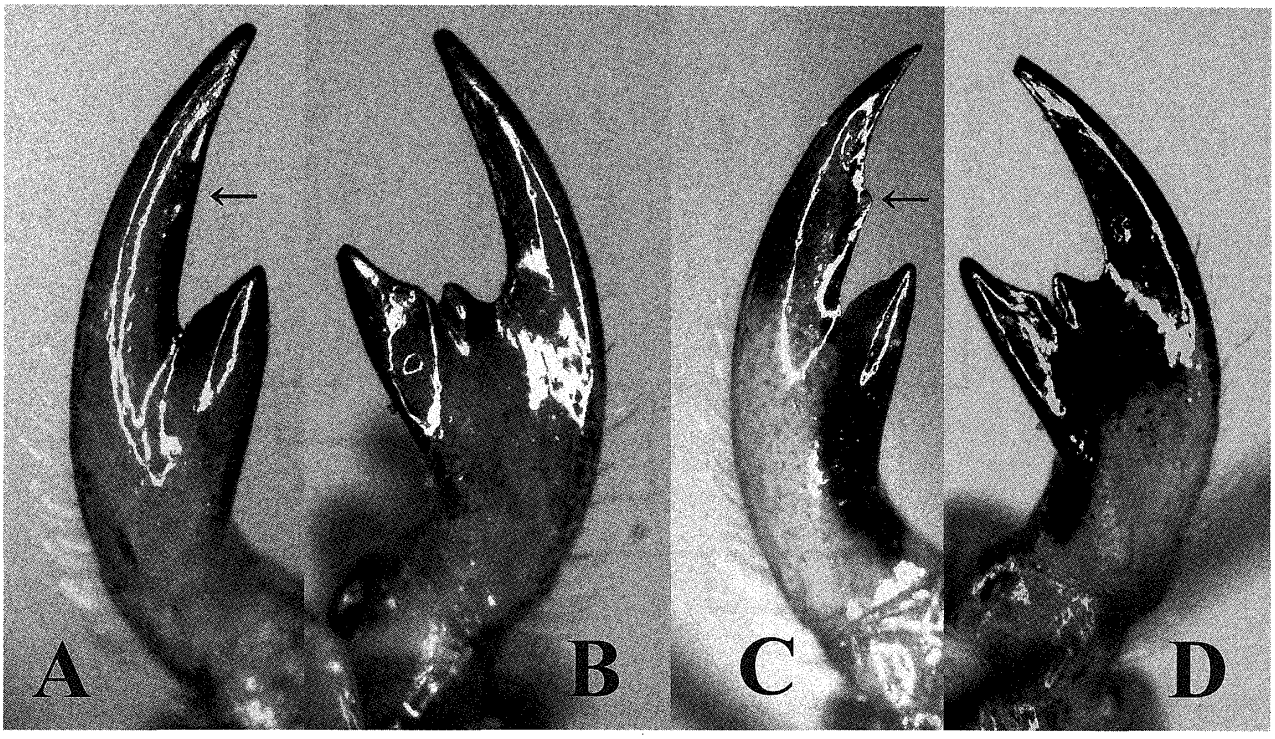

Fig. 4. Mandibles, right (B, D) and left (A, C), females.—A–B, *P. nitidiceps*, Mt. Taibaishan, Shaanxi, China; C–D, *P. uniformis*, same locality, paratype. Arrows show the presence (C) or absence (A) of the middle tooth in left mandible.

plex, a three-step transformation series as defined above is recognizable. The "outgroup" is coded (0) because it is a common condition among the congeners, including all the other members of the *alternans* group.

5. Facial crest in male moderately convex, rounded or bluntly carinate, distinctly pilose dorsally (0); very strongly convex, carinate, glabrous (1).

6. Antennal scape all pale (0) (Fig. 9 E–F, 16); usually mostly black (1) (Fig. 9 A–D). Both states occur in the *alternans* group and other species groups of *Pamphilius*. The "outgroup" is thus coded (?).

7. Mandibles normal (middle tooth of left mandible present and incision between middle and apical teeth of right mandible shallow) (0) (Fig. 4 C–D); modified (middle tooth of left mandible absent and incision between middle and apical teeth of right mandible deep) (1) (Fig. 4 A–B). The modification of the shape of mandibles, state (1), is known only for a few groups of Pamphiliinae, i.e., *Kelidoptera*, the *luteicornis* group of *Onycholyda* (Shinohara, 2002), *Pamphilius basilaris* Shinohara, 1982 (representing its own *basilaris* group, Shinohara, 1982, 2002) and *P. turkomanus* Shinohara, 1991 (belonging to the *lethierryi* subgroup of the *alternans* group, Shinohara, 1991, 2002) besides *P. nitidiceps* and *P. politiceps*. The state (0) is thus assigned to the "outgroup".

8. Basal lobe of tarsal claws rounded (0); angled (1). The state (0) is an ordinary state in *Pamphilius* and the state (1) is unique to the three species of the *komonensis* complex. The state (0) is thus assigned to the "outgroup".

9. Forewing without dark areas (0) (Figs. 1 A, C, G, 2 A); more or less darkened in apical 1/3 (1) (Figs. 1 E, I, K, 2 C, E, G). An ordinary state for *Pamphilius* is (0), but both (0) and (1) occur in the *alternans* group. The "outgroup" is thus coded (?).

10. Stigma uniformly pale orange (0) (Fig. 1 G, K); usually bicolored (1) (Figs. 1 C, E, 2 C, E, G); almost uniformly black (2) (Figs. 1 A, 2 A). All the character states occur in various groups

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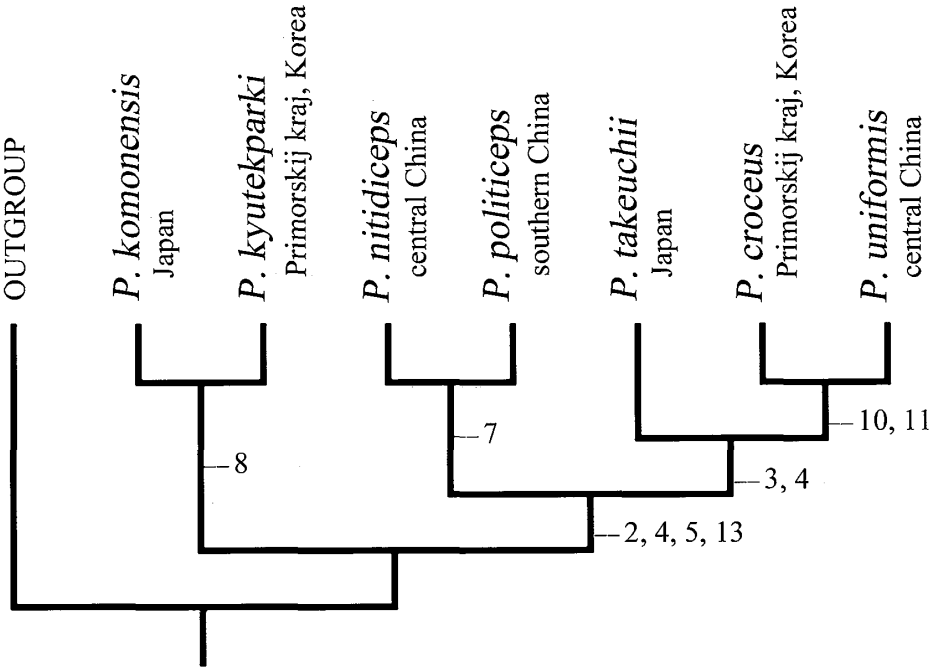

Fig. 5. Cladogram showing relationships of seven component species of *P. komonensis* complex with the distiribution of each species, created from the data matrix given in Table 1. See text for explanation.

of *Pamphilius*, though the states (0) and (1) only are found in the other members of the *alternans* group (Shinohara, 1991). The "outgroup" is here coded (?).

11. Cell C in forewing pilose (0); glabrous (1). Both states occur in the *alternans* group and other species groups of *Pamphilius*. The "outgroup" is thus coded (?).

12. Apex of subgenital plate rounded (0); broadly rounded (1); narrowly truncate (2). All the character states are known in various groups of *Pamphilius*, including the other members of the *alternans* group. The "outgroup" is thus coded (?).

13. Valviceps in dorsal view with anterior incision between valves shallow (0) (Figs. 12–13); deep (1) (Figs. 14, 17–19). The "outgroup" is coded "0", because it is a common character state within *Pamphilius* and the *alternans* group.

Results and discussion

Both the unordered and partly ordered analyses yielded one most parsimonious, fully resolved tree (length=19; CI=0.842) (Fig. 5), which is regarded as the best current estimate of the relationships of the seven species.

The obtained hypothesis of the relationships indicates that the first dichotomy in the *komonensis* complex is between *komonensis*+*kyutekparki* and the five remaining species. The combined distributional range of *komonensis*+*kyutekparki* (Primorskij kraj, Korea and Japan, Fig. 6) is almost the same as that of *takeuchii*+*croceus* (Fig. 8), a part of the latter clade. This partially sympatric distribution pattern of the two clades is difficult to explain on the basis of the available data.

The sister-species relationship of *P. komonensis* and *P. kyutekparki* is supported by the presence of an angled basal lobe of the tarsal claws (character 8, a similar state also occurs in *P. croceus*). These two species also share the same condition in most of the characters used for the analysis, though the resemblance is regarded as due to symplesiomorphy. The vicariant distributions of the two species, *P. komonensis* in Japan and *P. kyutekparki* in the Russian Far East (Primorskij kraj) and Korea (Fig. 6), should be a good support for their sister relationship. It is reasonable to assume that the two species evolved as a result of allopatric speciation.

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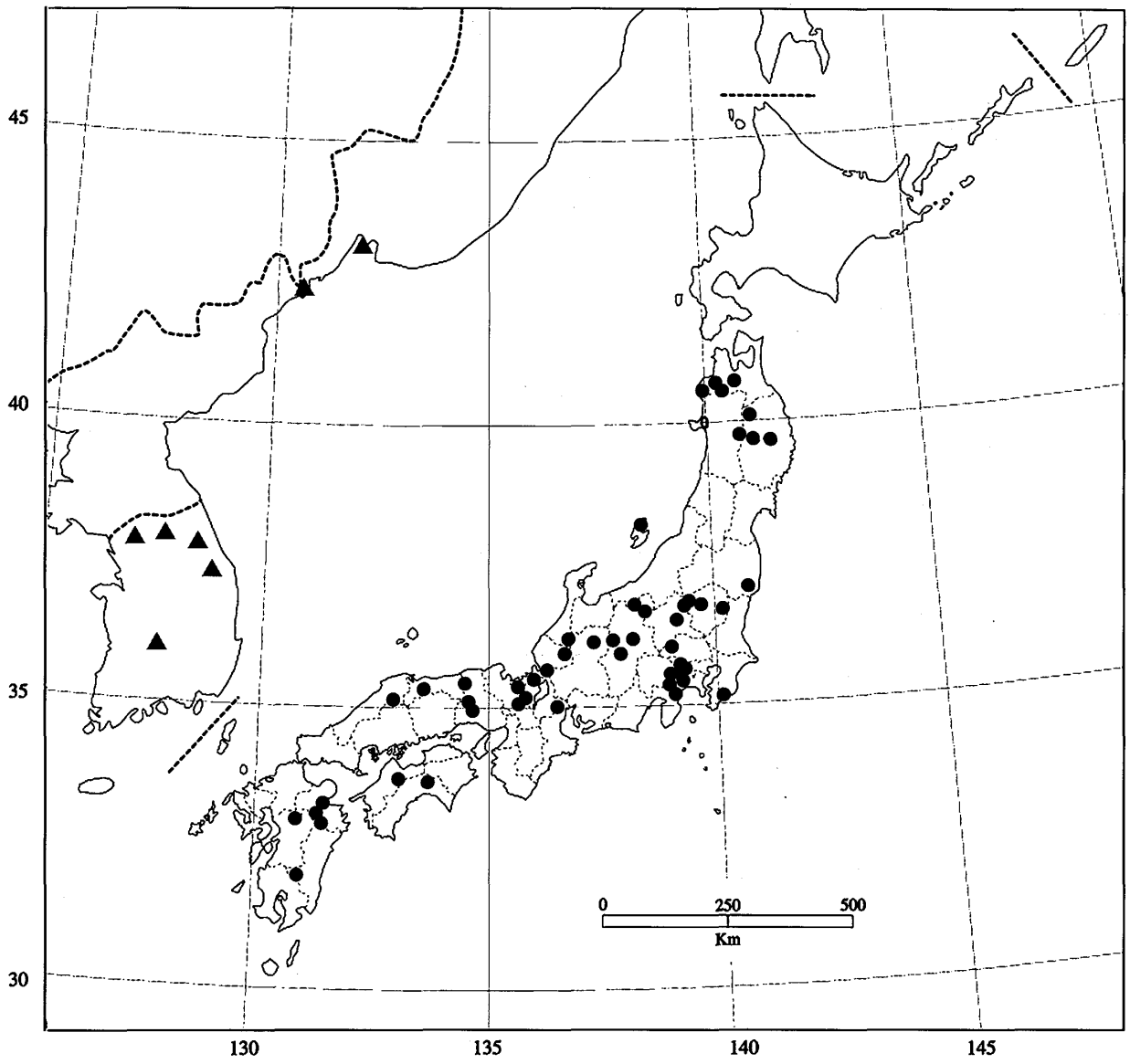

Fig. 6. Map showing distribution of *P. komonensis* (●) and *P. kyutekparki* (▲) based on the collection data of the specimens examined. Some overlapping plots are not shown.

Another clade of the basal dichotomy is represented by five species. The monophyly of this clade is well supported by four synapomorphies (characters 2, 4, 5, 13), but the evidence for its internal relationships is not very strong. However, the sister relationship of the two Chinese species, *P. nitidiceps* from Shaanxi Province and *P. politiceps* from Guangxi Province, seems to be certain, because they share very specialized mandibles (character 7) besides the overall similarity in morphology. These two species are really very close and possibly even conspecific; we need more information especially about the latter species to ascertain their taxonomic relationships.

According to the adopted hypothesis, the three remaining species, *P. takeuchii* from Japan, *P. croceus* from the Russian Far East (Primorskij kraj) and Korea, and *P. uniformis* from central China (Shaanxi), form a clade defined by two synapomorphies (character 3, upper frons in female with sharply defined notch; character 4, facial crest in female strongly inflated, carinate, and continuous to ridge on inner orbit), and the internal clade *croceus*+*uniformis* by two synapomorphies (character 10, stigma uniformly pale

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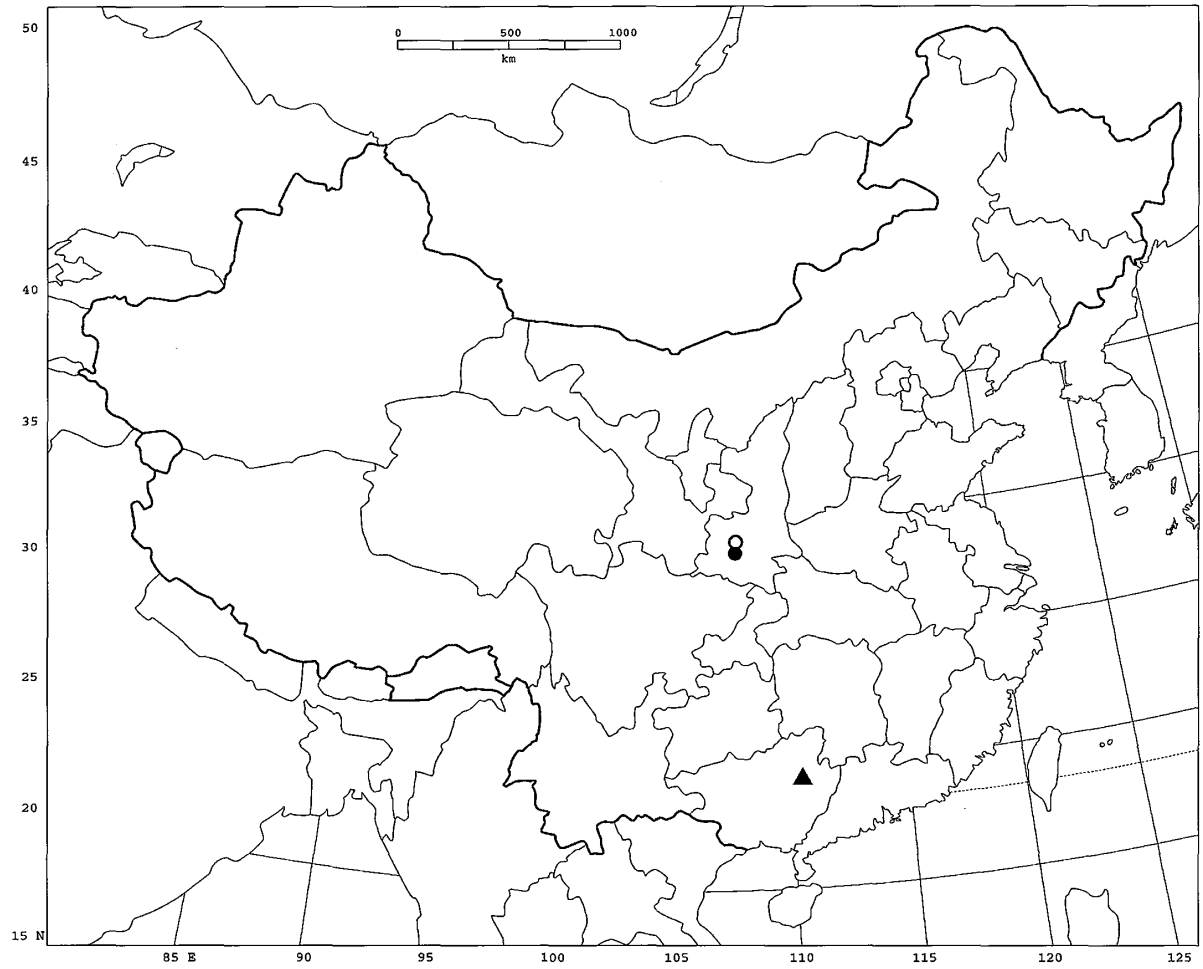

Fig. 7. Map showing distribution of *P. uniformis*, *P. nitidiceps* and *P. politiceps* based on the collection data of the specimens examined. ○: *P. uniformis* and *P. nitidiceps*; ●: *P. nitidiceps*; ▲: *P. politiceps*.

orange; character 11, cell C in forewing glabrous). Though the available material of *P. croceus* and *P. uniformis* is still very limited, the known distributional ranges of the three species are distantly separated and it is very likely that the three species evolved by the subdivision of the distributional range of the ancestral species.

Of the seven species of the *komonensis* complex, two species occur in Japan, two species in Russia (Primorskij kraj) to Korea, two species in central China (Shaanxi Province) and one species in south China (Guangxi Province). Besides the two species from Japan, material examined for each species is quite limited, and our knowledge on their distributional ranges is still quite fragmentary.

However, it is interesting to note that each of the two Japanese species has its nearest relative or the sister species in the mainland of Asia, *P. komonensis* with *P. kyutekparki* and *P. takeuchii* with (the common ancestor of) *P. croceus*+*P. uniformis*. It implies that the ancestor of each of the clades [*komonensis*+*kyutekparki*] and [*takeuchii*+*croceus*+*uniformis*] spread into Japanese Islands probably via a landbridge through the Korean peninsula and *P. komonensis* and *P. takeuchii* speciated in Japan after the closure of the Korean strait. *Pamphilius takeuchii* was able to extend its northern distribution into Hokkaido, as the current distribution of the species shows, but the probable absence of *P. komonensis* in Hokkaido suggests that this species did not disperse across the Tsugaru Strait between Hokkaido and Honshu for some reason.

The two Japanese species, *P. komonensis* and *P. takeuchii*, often occur together on lower moun-

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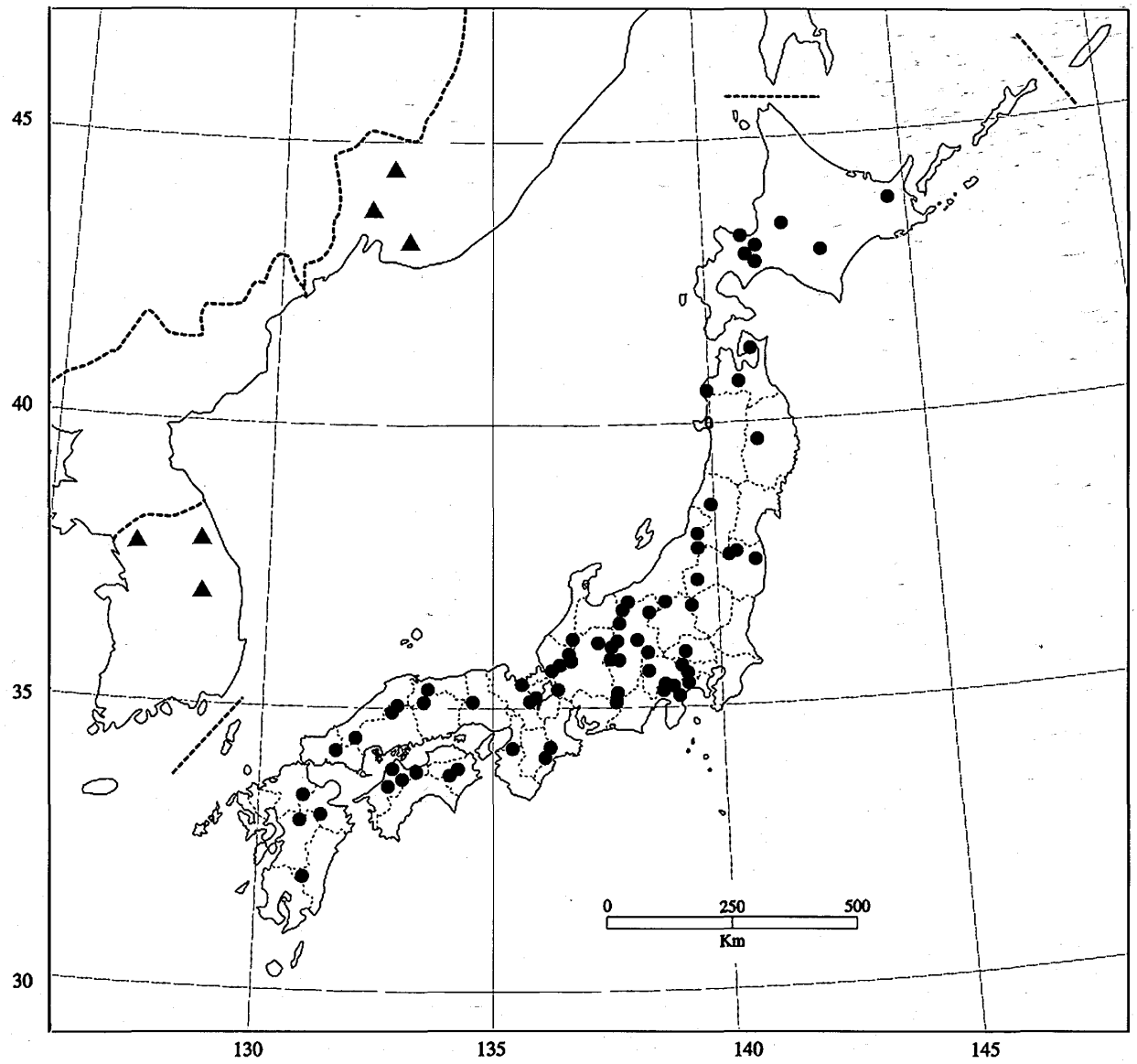

Fig. 8. Map showing distribution of *P. takeuchii* (●) and *P. croceus* (▲) based on the collection data of the specimens examined. Some overlapping plots are not shown.

tains in Honshu, Shikoku, and Kyushu and they feed on the same plant species, *Acer mono* (see Shinohara & Okutani, 1983). However, they show some differences in distribution. *Pamphilius komonensis* is found only in lowlands to lower mountains in Honshu, Shikoku, and Kyushu, with few collection records, if any, from the sites over 1500 m in altitude. On the other hand, *P. takeuchii* occurs also in Hokkaido and is found in lowlands to higher mountains, sometimes nearly up to the timber line around 2500 m high in central Honshu. This suggests some ecological or physiological differences between the two species concerning the tolerance towards low temperature and those differences may have contributed to the current occurrence of *P. takeuchii* and absence of *P. komonensis* in Hokkaido.

Key to species

Females

1. Upper frons moderately swollen, with distinct punctures (Fig. 9A–D).....2
— Upper frons strongly swollen, without distinct punctures (Figs. 9E–F, 16).....3
2. Frons usually with no pale yellow marks (Fig. 9 A–B); no pale yellow mark along lat-

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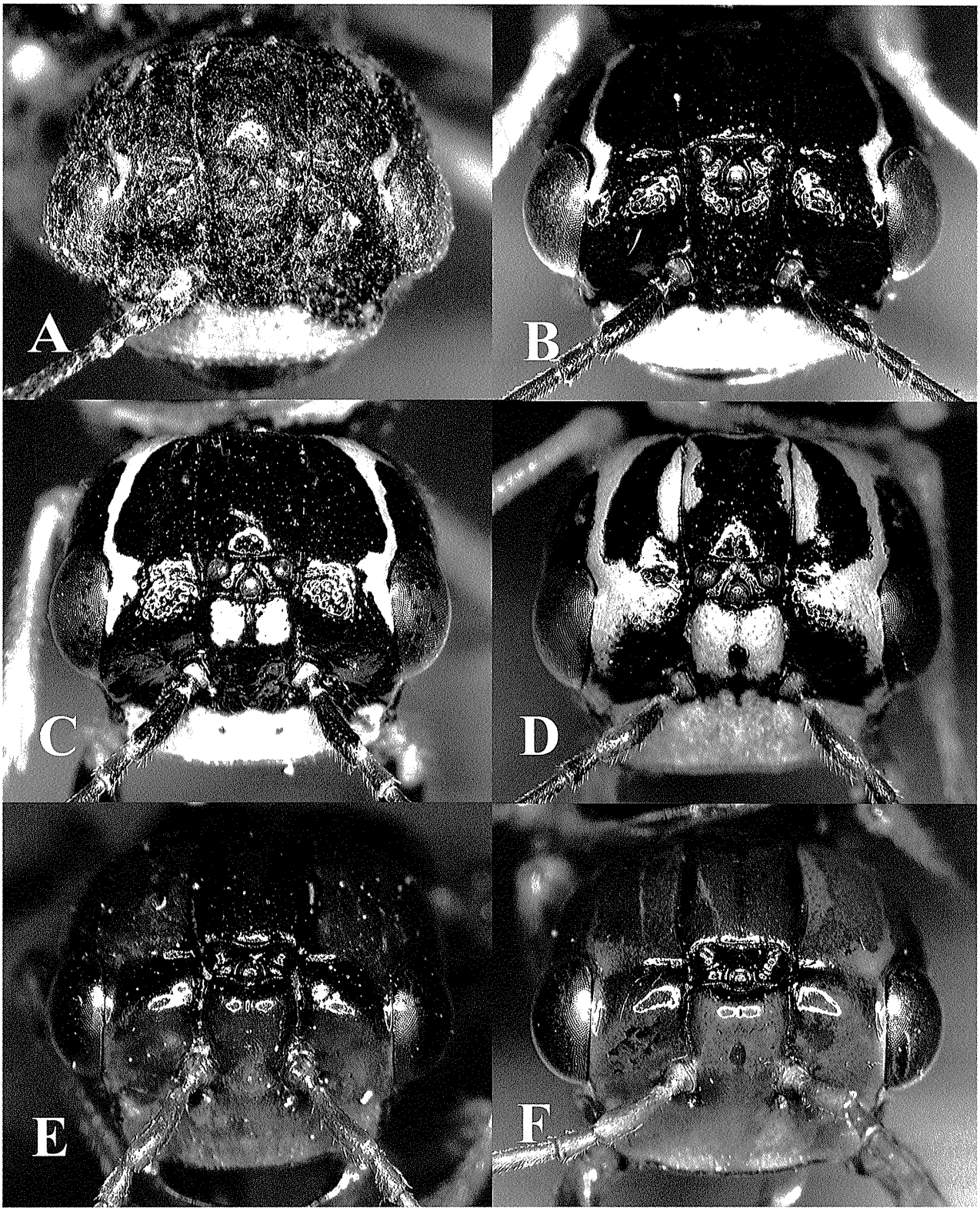

Fig. 9. *Pamphilius* spp., heads, dorsofrontal view, females.—A, *P. komonensis*, holotype; B, do., Mt. Daisen, Japan; C–D, *P. kyutekparki*, paratype, Mt. Odaesan, Korea; E, *P. nitidiceps*, holotype; F, do., Mt. Taibaishan, Shaanxi, China.

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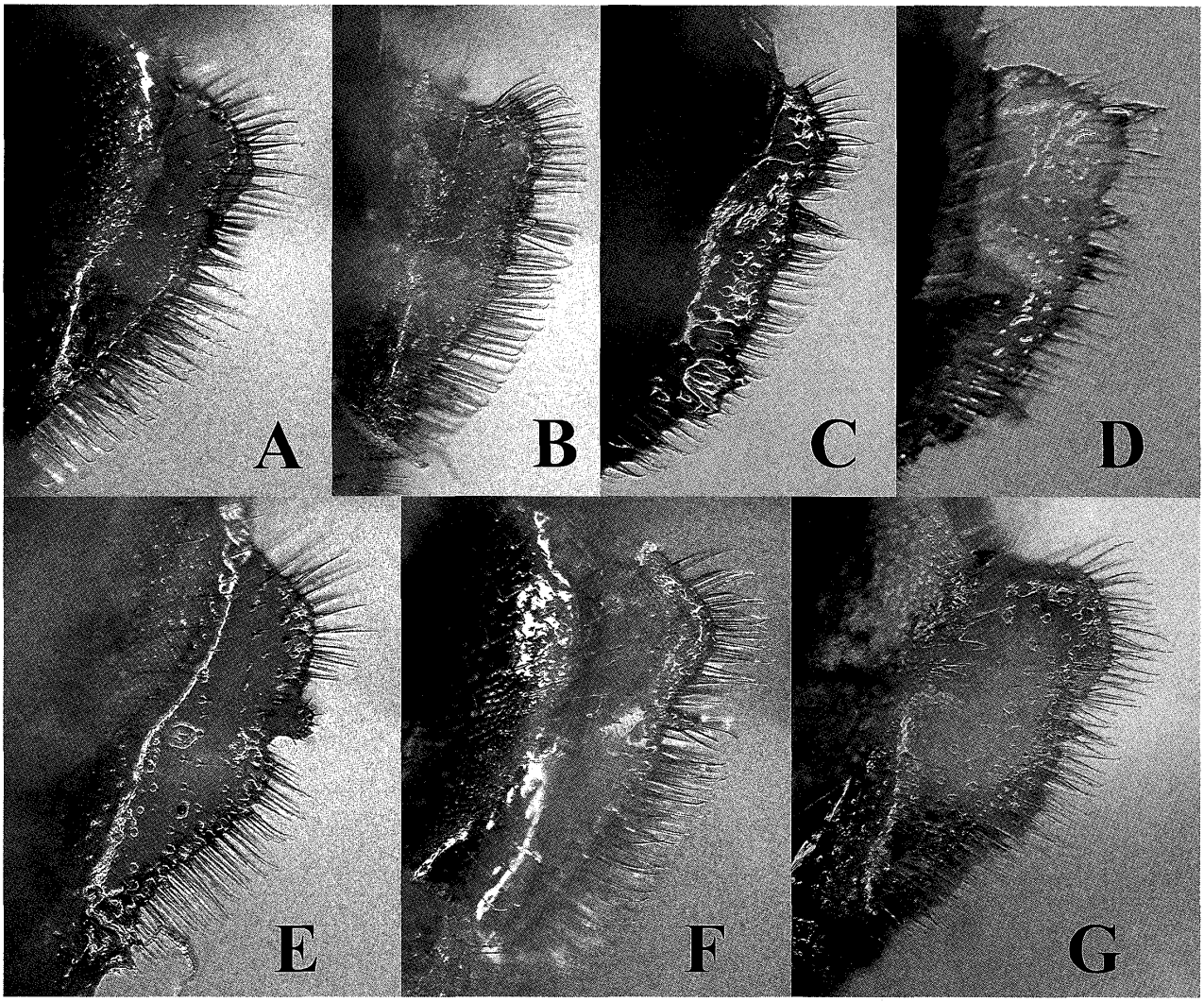

Fig. 10. *Pamphilius* spp., sawsheaths, lateral view.—A, *P. komonensis*, Shichimi-onsen, Japan; B, *P. kyutekparki*, paratype, Mt. Odaesan, Korea; C, *P. nitidiceps*, holotype; D, *P. politiceps*, holotype; E, *P. uniformis*, paratype, Mt. Taibaishan, Shaanxi, China; F, *P. takeuchii*, Mt. Daisen, Japan; G, *P. croceus*, Spassk, Russia.

eral suture (Fig. 9B); stigma almost uniformly blackish brown, with only extreme base somewhat yellowish (Fig. 1A); 2nd to 5th abdominal segments usually predominantly (at least laterally) black, with various extent of median orange areas (Figs. 1A–B, 2A–B). Japan (Honshu, Shikoku, Kyushu).... .....*P. komonensis* Takeuchi

— Frons with large pale yellow mark (usually paired spots) (Fig. 9C–D); pale yellow mark along lateral suture usually present (Fig. 9D); stigma pale brown, at least basally (Fig. 1C); 2nd to 5th abdominal segments orange, with black area confined to narrow anterior margin of 2nd segment (Fig. 1C–D). Russia (Primorskij kraj); Korea..... .....*P. kyutekparki* Shinohara

3. Left mandible without middle tooth (Fig. 4 A). 4

— Left mandible with distinct middle tooth (Fig. 4 C).....5

4. Ground color of head and triangular mark on mesoscutal median lobe dark orange; inner lobe of basal tooth of right mandible comparatively low, rounded; pronotum without black marking; cervical sclerite mostly dark orange (Fig. 1F, 2D); anterior half of mesoscutal lateral lobe with large dark orange marking (Fig. 1E, 2C). China (Shaanxi)..... .....*P. nitidiceps* Shinohara

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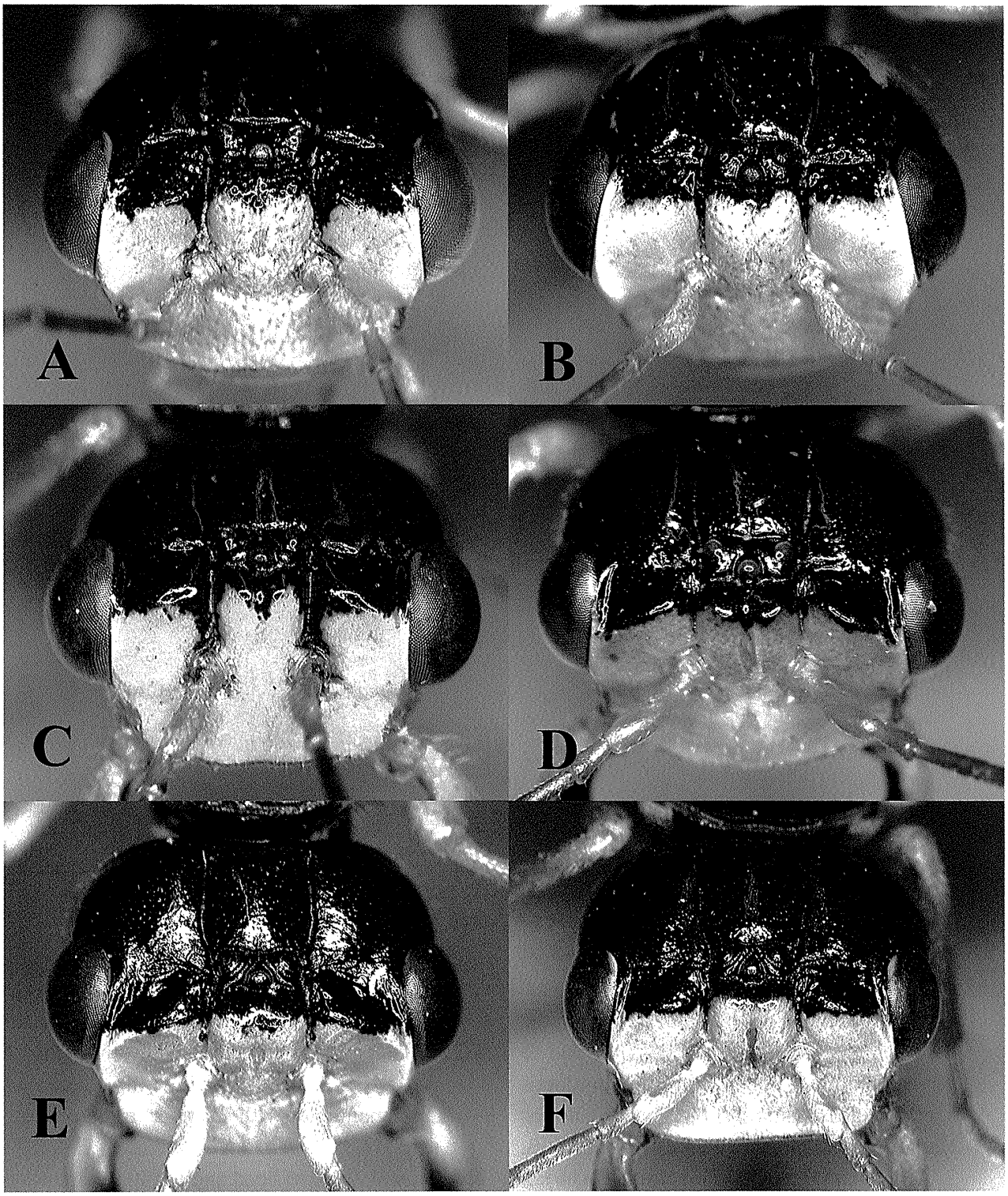

Fig. 11. *Pamphilius* spp., heads, dorsofrontal view, males.—A, *P. komonensis*, Mt. Jinbayama, Japan; B, *P. kyutekparki*, Mt. Odaesan, Korea; C, *P. nitidiceps*, Mt. Taibaishan, Shaanxi, China; D, *P. uniformis*, paratype, Mt. Taibaishan, Shaanxi, China; E, *P. takeuchii*, Nissho-toge, Japan; F, *P. croceus*, Mt. Odaesan, Korea.

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— Ground color of head and triangular mark on mesoscutal median lobe creamy white; inner lobe of basal tooth of right mandible angularly produced; pronotum with large black marking; cervical sclerite mostly black; anterior half of mesoscutal lateral lobe entirely black (Fig. 2E). China (Guangxi) .... *P. politiceps* Shinohara

5. Head pale yellow, with very large mark covering most of dorsal surface black; mesonotum and metanotum entirely black; abdomen black dorsally, with 2nd–5th segments medially orange, and entirely pale yellow ventrally (Fig. 1G–H); sawsheath peg very stout (Fig. 10E). China (Shaanxi)..... ..... *P. uniformis* sp. nov.

— Head not as above, usually mostly orange; mesonotum and metanotum usually with extensive pale yellow and orange areas; abdomen orange, with apex (usually 6th and more posterior segments) black (Fig. 1I–L); sawsheath peg slender (Fig. 10F–G).....6

6. Length 9–13.0 mm; antenna yellow, with flagellar segments beyond 4th–8th blackish; cervical sclerite and metepisternum entirely or predominantly black (Fig. 1I–J); tarsal claws with basal lobe usually not angled; stigma with blackish area in posterior apical part; veins in basal 3/5 of forewing usually mostly blackish brown (veins C, Sc, R and basal parts of M+Cu1 and anal veins often yellowish). Japan (Hokkaido, Honshu, Shikoku, Kyushu). .....*P. takeuchii* Beneš

— Length 13.0–14.5 mm; antenna yellow, with flagellar segments beyond 16th–20th blackish; cervical sclerite and metepisternum predominantly or entirely dark orange (Fig. 1 K–L); tarsal claws with basal lobe usually distinctly angled; entire stigma and all veins in basal 3/5 of forewing yellowish. Russia (Primorskij kraj); Korea..... ..... *P. croceus* Shinohara

Males

1. Upper frons moderately to strongly swollen, with distinct setiferous punctures (Fig. 11A–B); facial crest moderately convex, rounded or bluntly carinate, distinctly pilose dorsally; mesoscutal median lobe usually with yellow marking. 2

— Upper frons very strongly swollen, without distinct punctures, entirely glabrous (Fig. 11C–F); facial crest very strongly convex, carinate, glabrous; mesoscutal median lobe entirely black or with brownish marking. 3

2. Supraocular stripe absent; mesoscutal lateral lobe entirely black; stigma predominantly dark brown to blackish brown (Fig. 3A); genitalia as in Figs. 12, 15A. ...*P. komonensis*

— Supraocular stripe present, though usually broadly interrupted at middle; mesoscutal lateral lobe marked with pale yellow, at least with small pale yellow mark anterolateral to mesoscutellum; stigma predominantly pale yellow (Fig. 3C); genitalia as in Figs. 13, 15B .....*P. kyutekparki*

3. Left mandible without middle tooth (Fig. 4 A); right mandible with incision between apical and middle teeth very deep, much deeper than incision between middle and basal teeth (Fig. 4B); basal flagellar segments often very blackish, about as dark as apical segments; genitalia as in Figs. 14, 15 C. .....*P. nitidiceps*

— Left mandible with distinct middle tooth (Fig. 4 C); right mandible with incision between apical and middle teeth rather shallow, at most as deep as incision between middle and basal teeth (Fig. 4D); flagellum with basal segments not very blackish, often distinctly paler than apical segments. 4

4. Length 11–13 mm; wings distinctly blackish brown; mesoscutellum and metascutellum mostly pale yellow (Fig. 3K); apex of subgenital plate narrowly truncate; genitalia as in Figs. 19, 20C.....*P. croceus*

— Length 8–12 mm (usually less than 11 mm); wings subhyaline, sometimes brownish but rather lightly; mesoscutellum and metascutellum often entirely black (Fig. 3H–I); apex of subgenital plate usually rounded.....5

5. Stigma dull orange or pale brown, with ante-

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rior and posterior margins darkened; forewing without cloud in apical 1/3 (Fig. 3 G); genitalia as in Figs. 17, 20A..... .....*P. uniformis*

— Stigma pale yellow basally and blackish brown apically and at anterior and posterior margins; forewing usually with obscure cloud in apical 1/3 (Fig. 3I); genitalia as in Figs. 18, 20 B .....*P. takeuchii*

Pamphilius komonensis Takeuchi, 1930

(Figs. 1A–B, 2A–B, 3A–B, 6, 9A–B, 10A, 11A, 12, 15A)

Pamphilius komonensis Takeuchi, 1930: 12; Iwata, 1958: 51; Togashi, 1970: 55; Beneš, 1972b: 388; Okutani, 1972: 15; Shinohara & Okutani, 1983: 278; Murota & Kurokawa, 1985: 247; Abe & Togashi, 1989: 542; Shinohara, 1991: 52; Shinohara, 1998b: 242; Togashi, 1998: 252; Haneda *et al.*, 1998: 315; Nambu, 1998: 17; Togashi & Yamamoto, 2000: 706; Shinohara, 2002a: 424; Shinohara, 2002b: 190; Shinohara, 2004: 263; Nagase, 2004: 1244; Naito *et al.*, 2004: 9; Shinohara & Yamada, 2005: 59; Shinohara & Hara, 2005: 274.

Anoplolyda sp. Takeuchi, 1936: 164.

Pamphilius (*Anoplolyda*) *komonensis*: Klima, 1937: 57.

Pamphilius (*Onycholyda*) *komonensis*: Takeuchi, 1938: 229.

Pamphilius sp. 2 Togashi, 1970: 8.

Onycholyda komonensis: Beneš, 1974: 307; Okutani, 1974: 194.

Female. Length 8–11 mm. Head black, with clypeus and supraocular stripe pale yellow (Fig. 9A–B); supraocular stripe often interrupted at middle and rarely absent; frons rarely with obscure pale yellow marking; upper frons moderately swollen, with very shallow inconspicuous median notch and distinct punctures; facial crest low, rounded. Antenna blackish brown to black; 1st flagellar segment about 2.5–3.1×length of 2nd (n=40, 88% are 2.6–2.9). Mandibles pale yellow, usually with large black marking; sometimes mostly pale yellow or mostly black (except for base); right mandible with incision between apical and middle teeth shallower than incision between middle and basal teeth; inner lobe of basal tooth roundly produced; left mandible with distinct middle tooth. Thorax black, usually narrow posterior margin of dorsal pronotum, posterior half of mesoscutal median lobe, mesoscutellum and metascutellum pale yellow; often small pale yellow spot present at anterior margin of mesepisternum and on metanotum just behind cenchrus. Tarsal claws with angled basal lobe. Forewing almost clear hyaline without distinct cloud; veins blackish brown, vein C and Sc pale brown; stigma almost uniformly blackish brown, with only extreme base somewhat yellowish; cell C pilose all over. Abdomen black, often with orange mark covering median parts of 2nd to 4th (rarely also 5th) terga; posterior margin of each sternum usually broadly pale yellow. Sawsheath as in Fig. 10A.

Male. Length 7–10.5 mm. Supraocular stripe absent; upper frons moderately to strongly swollen, with distinct setiferous punctures; facial crest moderately convex, rounded or bluntly carinate, distinctly pilose dorsally. Antenna with scape and pedicel pale yellow and flagellum dark or blackish brown, further darkened towards apex; scape and apex of pedicel often darkened or marked with black particularly in southern specimens; 1st flagellar segment about 2.4–3.0×length of 2nd (n=100, 78% are 2.6–2.8). Mandibles pale yellow, rufous at apex, usually with black marks on inner teeth; right mandible with incision between apical and middle teeth shallow, usually shallower than incision between middle and basal teeth; left mandible with distinct middle tooth. Mesoscutal median lobe usually with yellow mark (usually without yellow mark in specimens from Shikoku); mesoscutal lateral lobe entirely black; mesoscutellum and metascutellum pale yellow; ventral side of thorax black, with various extent of pale yellow areas; pale yellow areas usually large, sometimes covering most of ventral surface, in northern specimens but usually very small in

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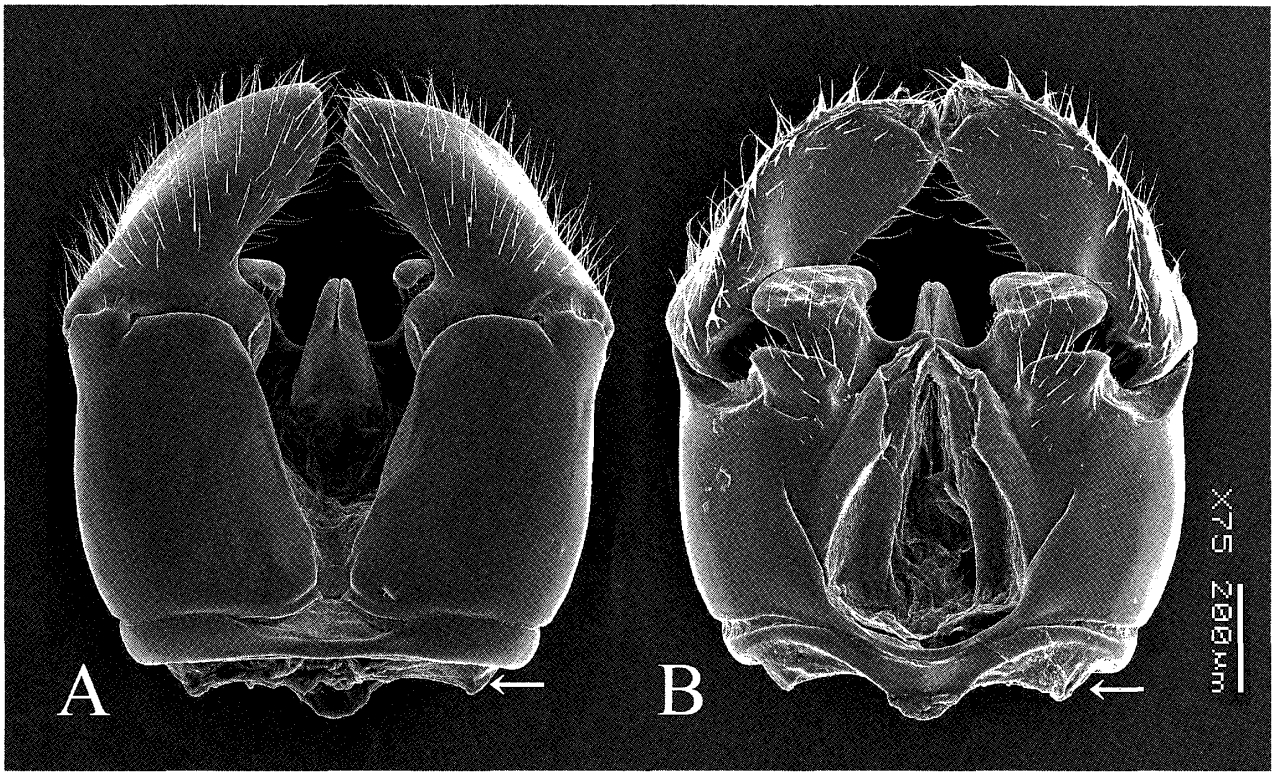

Fig. 12. *Pamphilius komonensis*, male genitalia, Mt. Ishizuchiyama, Japan. Arrows show the plate-like process along the proximal margin of the ventral arm of the gonostipes, which exceeds the proximal margin of the gonocardo.

specimens from Shikoku and Kyushu. Forewing subhyaline, sometimes very faintly brownish; stigma predominantly dark brown to blackish brown, sometimes basal part paler; cell C pilose. Dorsal side of abdomen black, usually with 4th and 5th segments (also 2nd and 3rd in very pale specimens) partly orange, orange marks absent or nearly so in specimens from Shikoku and Kyushu; ventral side usually mostly pale yellow in northern specimens but black with broad posterior margins of sterna and most of subgenital plate pale yellow in southwestern specimens. Apex of subgenital plate rounded. Genitalia as in Figs. 12, 15A.

Distribution. Japan (Honshu, Shikoku, Kyushu) (Fig. 6).

Type material examined. Holotype (Fig. 2 A–B): ♀, "Komono, 25.V.1920, Takeuchi" "*Pamphilius komonensis* Take., Holotype" (OPU).

Other material examined (51♀989♂). HONSHU: Aomori Pref.: 1♀, Mt. Iwakisan, 19.VII.2000, H. Nagase (HNC); 2♂, Mt. Kuromori, Kuroishi, 6. VI. 1985, M. Yamada (MYC); 6♂, Mt. Tashiro, Kuroishi, 11. VI. 1994, M. Yamada (MYC, NSMT); 1♂, Ohmagoshi, Iwasaki, 2. VI. 1999, M. Yamada (MYC); 5♂, Tozando, Dake–Mt. Iwakisan, 29. V. 1994, M. Yamada (MYC); 1♂, Chokeimori, Soma, 10. VI. 1989, M. Yamada (MYC); 1♀, same except 7. VI. 1998 (MYC). Iwate Pref.: 1♂, Tsunagi spa, 3.VI.1981, T. Oku (NSMT); 1♂, same except T. Tanabe (NSMT); 10♂, same except 29.V.1982, A. Shinohara (NSMT); 1♂, Near Hachimantai, Ashiro, ca.1000–1300 m, 10–13. VII.1995, H. Yoshitomi (NSMT); 1♂, Hiratsuno, Kawai-mura, 26.V.1998, H. Takahashi (NSMT). Akita Pref.: 2♂, Akita-Kuroyu, 14.VI.1951, Takeuchi (OPU). Fukushima Pref.: 15♂, Shitokigawa-keikoku, Iwaki, 6.V.1982, A. Shinohara (NSMT). Tochigi Pref.: 1♂, Meotobuchi spa, 4. VI. 1973, A. Shinohara (NSMT); 3♂, Ouchi, Bato, 5–7. V. 1994, A. & T. Shinohara (NSMT); 1♀, Kinugawa-onsen, 11. V. 1997, A. Shinohara (NSMT). Gunma Pref.: 2♂, Minowa, Mt. Akagisan,

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1000 m, 17–20. V. 2001, A. Shinohara (NSMT); 1♂, Marunuma, 1400 m, 8–9. VI. 2001, A. Shinohara (NSMT). Chiba Pref.: 1♂, Mt. Kiyosumiyama, 1.V.1981, H. Kumamoto (HKC). Saitama Pref.: 1♂, Mt. Futagoyama, Ogano, 10. V. 1977, K. Hara (NSMT). Tokyo Met.: 1♀, Hodokubo, Hino-shi, 3. V. 2003, H. Takahashi (NSMT); 3♂, Yokosawairi, Akiruno-shi, 27. IV. 1997, H. Takahashi (NSMT); 1♂, same data except 1. V. 1999 (NSMT); 1♀, Hatsuzawa, Hachioji, 8. V. 1999, Y. Okushima (NSMT); 1♀, Mt. Takaosan, 9.V.1916 (NSMT); 1♂, Mt. Takaosan, 3. V. 1960, J. Yoshioka (NSMT); 1♀, Mt. Takaosan, 12.V.1963, J. Minamikawa (NIAES); 2♂, Kobotoke, nr. Mt. Takaosan, 5. V. 1968, A. Shinohara (NSMT); 2♂, same except 3. V.1973 (NSMT); 1♂, Kamiange, Mt. Jinbasan, 10.V.1973, A. Shinohara (NSMT); 2♂, same except 11.V.1973 (NSMT); 3♂, same except 20. V.1973 (NSMT); 2♂, same except 25.V.1973 (NSMT); 5♂, same except 4. V.1974 (NSMT); 9♂, same except 12.V.1974 (NSMT); 1♀5♂, same except 30.IV.1977 (NSMT); 1♀3♂, same except 8.V.1977 (NSMT); 4♂, same except N. Matsuba (NSMT); 2♂, same except 15.V.1977, A. Shinohara (NSMT); 3♂, same except N. Matsuba (NSMT); 1♀2♂, same except 21. V. 1977, A. Shinohara (NSMT); 6♂, same except 14.V.1978 (NSMT); 1♂, same except 1.V.1979 (NSMT); 1♂, same except N. Matsuba (NSMT); 9♂, same except 3.V.1979, A. Shinohara (NSMT); 4♂, same except N. Matsuba (NSMT); 7♂, same except 5.V.1979, A. Shinohara (NSMT); 5♂, same except 8.V.1982 (NSMT); 1♀4♂, same except 9.V.1987 (NSMT); 19♂, same except 6.V.1991 (NSMT); 5♂, same except 29.IV.1997 (NSMT); 59♂, same except 29.IV.1998 (NSMT); 5♂, same except 7.V.1998 (NSMT); 1♀17♂, same except 2.V.1999 (NSMT); 1♀17♂, same except 30.IV.2000 (NSMT); 14♂, same except 7. V. 2000, A. & T. Shinohara (NSMT); 1♂, same except 4. V. 2001, A. Shinohara (NSMT); 45♂, same except 7. V. 2001 (NSMT); 15♂, same except 29. IV. 2002 (NSMT); 6♂, same except 5. V. 2002, A. & N. Shinohara (NSMT); 2♂, Tochiyorizawa, Okutama, 21. V. 1971, A. Shinohara (NSMT); 1♂, same except 29. IV. 1972, A. Shinohara (NSMT); 1♂, Mt. Mitakesan, Okutama, 17. V. 1988, A. Shinohara (NSMT); 1♂, Nishitama-gun, Hinohara-mura, Yazawa, 9. V. 2000, H. Takahashi (NSMT). Kanagawa Pref.: 1♀, Hakone, 19.V.1921 (NSMT); 1♀, Magino, Fujino-machi, 19. IV. 2002, I. Aihara (HNC); 1♀, same except H. Nagase (HNC); 1♂, Mikuni-toge, 1100 m, Yamakita, 25. V. 2002, H. Nagase (HNC); 3♂, same except 19. V. 2005 (HNC); 1♂, same except 1. VI. 2005 (HNC); 1♂, Nanasawa, Fudojiri, Atsugi City, 17. VI. 2001, I. Aihara (HNC); 2♀, Shimofurusawa, Atsugi City, 25. IV. 2000, I. Waki (HNC); 1♂, Mt. Yusaka-yama, Hakone Town, 21.IV.1966, H. Suda (HNC). Niigata Pref.: 1♀, Seki, Sado Is., 4.VII.1936 (OPU). Ishikawa Pref.: 2♂, Kamadani, 26.V.1966, I. Togashi [1♂ with label "*Pamphilius* sp. 2"] (NSMT); 1♂, Mt. Sunagozen, 7.VI.1970, I. Togashi (NSMT); 1♂, Futakuchi, 31.V.1970, I. Togashi (NSMT); 1♂, Mitsudani, Shiramine-M., 24.V.1973, I. Togashi (NSMT); 2♂, Mt. Hakusan, 5.VI.1977, I. Togashi (NSMT). Fukui Pref.: 1♀1♂, Kinometoge, Imajo-cho, 31.V.1987 (NSMT); 1♀, Ifuriyama, Ohno, 13.V.1965, Y. Haneda (NSMT); 1♀, Koike, 1.VI.1957, K. Tsuneki (NSMT); 2♂, Mt. Ojigatake, Ojigadani, 6.V.1979, T. Murota (NSMT); 1♂, Mushi-dani, Natasho-mura, 9.V.1982, T. Murota (NSMT). Yamanashi Pref.: 1♀, Yanagawa, 25.V.1973, H. Kurahashi (NSMT); 1♀, Kouyoudai, 14.VI.1992, H. Takahashi (NSMT); 1♀, Kawai, Uenohara, 14. V. 1991, H. Suda (HSC); 1♀, Torisawa, Otsuki, 7. V. 1974, H. Suda (HSC); 1♂, Yoshikubo, Sasago, Otsuki, 17. V. 1988, H. Suda (HSC); 2♂, Kanayama-kogen, Sudama, 28. V. 1979, H. Suda (HSC); 1♂, Nishizawa-keikoku, Mitomi, 28. V. 1980, H. Suda (HSC). Nagano Pref.: 2♂, Nojiriko, 28.V.1981, A. Shinohara (NSMT); 1♀3♂, Shichimi-onsen, 4.VI.1985, A. Shinohara (NSMT); 1♀, Shirahone-onsen, 2.VI.1984, A. Shinohara (NSMT); 57♂, Oshirakawa-rindo, Azumi-mura, 4–6.VI.1990, A. Shinohara (NSMT); 1♂, Shimashima, Azumi-mura, 23.V. 1985, A. Shinohara (NSMT); 33♂, Misayama-toge, nr. Kakeyu, 29.V.1981, A. Shinohara

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(NSMT); 1♂, Tobira-onsen, 5.VI.1984, A. Shinohara (NSMT); 33♂, same except 26–31. V.1985 (NSMT); 1♀1♂, Ina Uchinokaya, 11.VI.1968, T. Naito (NSMT). Gifu Pref.: 6♂, Takayama, 20. V.1979, A. Shinohara (NSMT). Shiga Pref.: 1♂, Mt. Sanjusangen-yama, 26.V.1984, K. Mizuno (NSMT). Kyoto Pref.: 1♂, Hacchodaira, 26.V.1940, Takeuchi (OPU); 1♂, Kibune, 10.V.1940, T. Kimura (OPU); 1♀, Mt. Mine, 28.VI.1954 (OPU). Hyogo Pref.: 1♂, Hataganaru (Tazima), larva on *Acer mono* collected 15.VII.1958, emerged 18. IV. 1959, T. Okutani (KU); 4♂, Hataganaru, Onsen, 21.V.1999, A. Shinohara (NSMT); 1♂, same except Y. Okushima (NSMT); 2♀, Tajima, Mt. Ogi, 11.VI.1962, T. Naito (KU); 1♂, Onzui, Haga-cho, 580 m, 13. V. 2000, T. Morita (MNHAH); 1♂, Akasai-keikoku, Haga-cho, 680 m, 5. V. 2002, T. Morita (MNHAH); 29♂, Akasai-keikoku, Haga-cho, 20–23.V.1999, A. Shinohara (NSMT); 1♂, same locality, 21. V. 2000, T. Naito (MNHAH); 1♀, Yasutomi-cho, 20.V.1978, N. Hirose (KU); 1♀, Kojo, Muraoka-cho, 14. V. 1991, T. Yagi (KU). Tottori Pref.: 1♀, Daisen, 15.VI.1974, B. Nasu (TKC); 55♂, Sannosawa, Mt. Daisen, 20–22.V.1981, A. Shinohara (NSMT); 1♀230♂, Yokotemichi, w. slope of Mt. Daisen, 1000 m, 20–25.V.2000, A. Shinohara (NSMT); 113♂, same except 25–29.V.2001 (NSMT); 1♂, Daisen t., Yokotemichi, 35-22-40N/ 133-31-22E, 7.V.2004, R. Matsumoto (OMNH); 4♀, Ichinosawa, sw. slope of Mt. Daisen, 28.V.2001, A. Shinohara (NSMT). Shimane Pref.: 1♂, Nita (Uchiodani), 18.V.1980, H. Nishida (NSMT). SHIKOKU: Ehime Pref.: 3♀, Omogokei, 5.VI.1980, Y. Seiyama (NSMT); 2♀6♂, Nanokawagoe, 33°45′N133°09′E, 1450 m, nr. Tsuchigoya, Ishizuchiyama Mts., 2–4.VI.2003, A. Shinohara (NSMT); 29♂, same except 8–10. VI. 2005 (NSMT); 1♂, Koyayama, Odamiyama, 5.VI.1995, E. Yamamoto (NSMT). Kochi Pref.: 1♀, Mt. Gozaisho, Prov. Tosa, 2.VI.1935, H. Okamoto (HU). KYUSHU: Kumamoto Pref.: 1♀, Mt. Kura-dake, ca.1000 m, 17.V.1997, A. Shinohara (NSMT). Oita Pref.: 1♀, Mt. Sobo, 26.V.1932, Takeuchi (OPU); 2♂, Mt. Kurodake, Kuju-san Mts., 900–1100 m, 16–24.V.1986, A. Shinohara (NSMT); 1♀, same except 18–19.V.1997 (NSMT); 1♀, Kuju-san, 21. V. 1971, A. Nagatomi (KSU); 1♂, Mt. Yufu-dake, 5.V.1968, H. Kumamoto (HKC). Miyazaki Pref.: 1♀, Kobayashi c., Hamanose, 27. IV. 2003, T. Saigusa (OMNH).

Host plant. *Acer mono* Maxim. (see Shinohara & Okutani, 1983).

Remarks. This species may be distinguished from the other members of the *P. komonensis* complex by the characters given in the key. Among the Japanese congeners of the other species groups, *P. zhelochovtsevi nipponicus* Shinohara, 1993, from Honshu, belonging to the *sulphureipes* group, may look similar to this species; however, in the former species, the upper frons and the postocellar and postocular areas have no setiferous punctures, the cell C of the forewing is glabrous, the thorax and abdomen have more pale yellow areas, the abdomen has no orange marks, and the stigma is bicolored. Dark female specimens of *P. komonensis* may superficially resemble some *Onycholyda* species, but, in addition to the generic differences, the entirely pale yellow clypeus and legs will help identification.

This is one of the commonest species of *Pamphilius* on lower mountains in Honshu and often occurs with *P. takeuchii*, which feeds on the same plant species, *Acer mono* (see Shinohara & Okutani, 1983). However, details of the biology of *P. komonensis* are still unknown and the larva has not been differentiated from that of *P. takeuchii* (see Shinohara & Hara, 2005).

Pamphilius kyutekparki Shinohara, 1991

(Figs. 1C–D, 3C–D, 6, 9C–D, 10B, 11B, 13, 15B)

Pamphilius jucundus: Kim, 1980: 3, pl. v, HYPA01 (not Takeuchi, 1930).

Pamphilius kyutekparki Shinohara, 1991: 53; Kim *et al*., 1994: 217; Zhelochovtsev & Zinovjev, 1995: 397; Shinohara & Lee, 1997: 216; Shinohara, 2002a: 424; Shinohara, 2004: 263.

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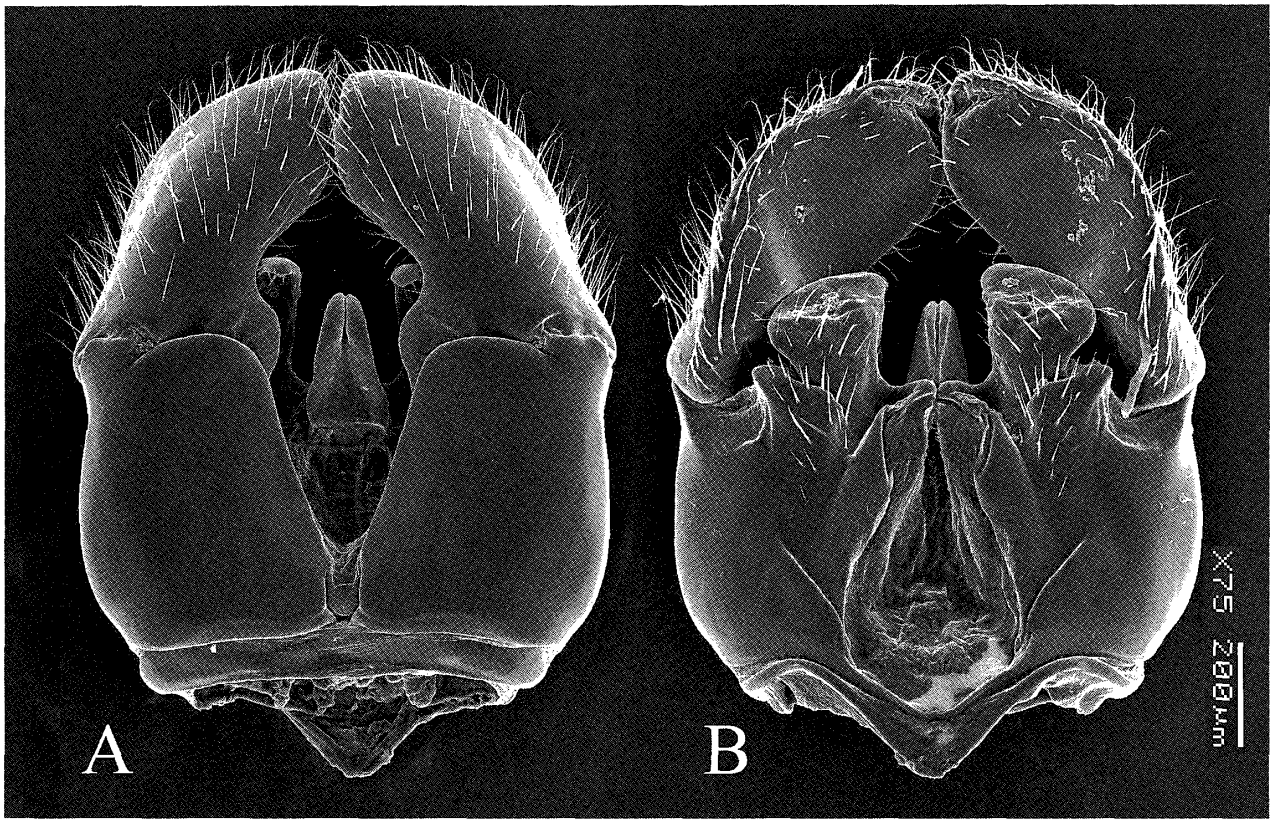

Fig. 13. *Pamphilius kyutekparki*, male genitalia, Mt. Odaesan, Korea.

Female. Length 8–11 mm. Head black, with clypeus, supraocular stripe, large mark (usually paired spots) on frons, and usually line along lateral suture pale yellow; sometimes additional marking on postocellar area, malar space and gena pale yellow (Fig. 9C–D); upper frons moderately swollen, with very shallow inconspicuous median notch and distinct punctures; facial crest low, rounded. Antenna blackish brown to black; in very pale specimens, scape, pedicel and basal flagellar segments partly whitish; 1st flagellar segment about 2.4–2.8×length of 2nd (n=12). Mandibles pale yellow, usually with large black marking; sometimes mostly pale yellow or mostly black (except for base); right mandible with incision between apical and middle teeth shallower than incision between middle and basal teeth; inner lobe of basal tooth roundly produced; left mandible with distinct middle tooth. Thorax black, usually posterior margin of dorsal pronotum, spot at ventral margin of lateral pronotum, posterior half of mesoscutal median lobe, mesoscutellum, metascutellum, and transverse spot on metanotum just behind cenchrus pale yellow; sometimes pale yellow spot on lateral pronotum missing; often pale yellow spot present on mesonotal lateral lobe adjacent to mesoscutellum; in very pale specimens, additional spots on cervical sclerite, anterior part of mesoscutal lateral lobe, posttergite, at anterior margin of mesepisternum, and in posterior part of mesepisternum pale yellow. Tarsal claws with angled basal lobe. Forewing almost clear hyaline without distinct cloud; veins blackish brown, vein C and Sc pale brown; stigma pale brown, with posterior margin and apical part blackish brown; cell C pilose all over. Abdomen orange, with propodeum and 6th and more posterior segments black; anterior margin of 2nd tergum sometimes narrowly black. Sawsheath as in Fig. 10 B.

Male. Length 7–10 mm. Supraocular stripe usually present, though usually broadly interrupted at middle; upper frons moderately to strongly swollen, with distinct setiferous punctures; facial crest moderately convex, rounded or bluntly carinate, distinctly pilose dorsally. Antenna pale yel-

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low, becoming blackish towards apex; basal flagellar segments not blackish; 1st flagellar segment about 2.0–3.3×length of 2nd (n=103, 90% are 2.5–2.9). Mandibles pale yellow, rufous at apex, often with obscure blackish mark along inner margin; right mandible with incision between apical and middle teeth shallow, usually shallower than incision between middle and basal teeth; left mandible with distinct middle tooth. Mesoscutal median and lateral lobes with pale yellow marks; those on lateral lobe sometimes reduced but at least small pale yellow mark anterolateral to mesoscutellum present; mesoscutellum and metascutellum pale yellow; ventral side of thorax pale yellow. Forewing subhyaline, sometimes very faintly brownish; stigma pale yellow, with posteroapical part blackish; cell C pilose. Dorsal side of abdomen black, with lateral margins pale yellow and usually part of 3rd to 5th (sometimes also 2nd) segments orange; ventral side entirely pale yellow. Apex of subgenital plate rounded. Genitalia as in Figs. 13, 15B.

Distribution. Russia (Primorskij kraj); Korea (Fig. 6).

Type material examined. Holotype: ♂, "Mirugam (Pugdaesa), Mt. Odaesan, 1300 m alt., 10. VI. 1987, A. Shinohara" "Holotype, *Pamphilius kyutekparki* Shinohara, n. sp., det. Shinohara, 1991" (KNU). Paratypes (6♀28♂): RUSSIA: Primorskij kraj: 1♀, Khasan, r-n Zanadvorovka, 5. VI. 1972, A. Ponomarenko (MU); 1♀, Vladivostok, Lesnaja, Zaimka, 26. VI. 1982, A. Zinovjev (ZISP). KOREA: Kyonggi-do: 1♀, Kwangneung, 18. VI. 1974, Y.-J. Kwon (EWU); 1♂, Kwangneung, 14. V. 1980, A. & N. Shinohara (NSMT). Kangwon-do: 1♂, Chongpyongsa, nr. Chunchon, 1. VI. 1987, A. Shinohara (NSMT); 1♀, same data as for holotype except 9. VI. 1987 (NSMT) [Shinohara (1991) erroneously gave the date "8.VI.1987" for this specimen]; 2♀8♂, same except 10–11. VI. 1987 (NSMT); 9♂, same except 27. V. 1989 (NSMT) [Shinohara (1991) erroneously cited these as females]; 9♂, same except 28–30. V. 1989 (NSMT).

Other material examind (10♀78♂). RUSSIA: 1♀, 6 km E of Okeanskaja Station, Vladivostok, Primorskij kraj, 9–10. VI. 1994, A. Shinohara (NSMT). KOREA: Kangwon-do: 1♀, Tokchomkogae, nr. Chunchon, 510 m alt., 23–24. V. 1991, A. Shinohara (NSMT); 2♀, same except 4. VI. 1991 (NSMT); 1♀, Sangwonsa, Mt. Odaesan, 850 m alt., 8. VI. 1987, A. Shinohara (NSMT) [Shinohara (1991) actually examined this specimen but did not cite it by mistake]; 1♀5♂, same as for holotype except 28.V.–2.VI.1991 (NSMT); 1♀4♂, same except 29. V.–6. VI. 1996 (NSMT); 7♂, same except 1–7. VI. 1997 (NSMT); 38♂, same except 27.V.–1.VI.1998 (NSMT); 9♂, same except 29.V.–3.VI.2002 (NSMT); 1♀12♂, Chin-kogae, Mt. Odaesan, 850 m alt., 1–2.VI. 1992, A. Shinohara (NSMT); 1♂, same except 26. V. 1993 (NSMT); 1♂, Taebaek-shi, Choram 1-dong, 15.V.1992, S. M. Ryu (YUK). Chollabuk-do: 1♀, Solchon-myon, Mujuguchondong, 9.VI.1972, J.I. Kim (YUK); 1♀, same except 10.VI.1972, J.H. Ryu (YUK).

Host plant. Unknown.

Remarks. This species is very closely allied to the Japanese *P. komonensis* but separable from it by the pale color pattern as shown in the key. Among the congeners occurring in Primorskij kraj and Korea, *P. zhelochovtsevi zhelochovtsevi* Beneš, 1974, belonging to the *sulphureipes* group, may resemble *P. kyutekparki*, but the former differs from the latter in the entirely impunctate and glabrous upper frons and postocellar and postocular areas, entirely glabrous cell C of the forewing, and the lack of orange areas on the abdomen. As Shinohara (1991) noted, the adults of this species were often found on the leaves of *Acer* sp., a possible host plant.

Pamphilius nitidiceps Shinohara, 1998

(Figs. 1E–F, 2C–D, 3E–F, 4A–B, 7, 9E–F, 10C, 11C, 14, 15C)

Pamphilius nitidiceps Shinohara, 1998a: 18; Shinohara, 2002a: 424; Shinohara, 2004: 263; Shinohara & Yuan, 2004: 184.

Female. Length 9–11 mm. Head dark orange; clypeus and ventral part of head more or less pale

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yellowish; black spot covering ocellar area, often extending along antennal and lateral sutures, and in darkest cases, covering also most of postocellar area and dorsal surface of each facial crest (Fig. 9E–F); upper frons strongly swollen, with very shallow, inconspicuous median notch, without distinct punctures; facial crest strongly inflated, rounded, not continuous to ridge on inner orbit. Antennal scape and pedicel orange and flagellum pale yellow, with flagellar segments beyond 12th–15th becoming blackish; pedicel and 1st and 2nd flagellar segments often marked with blackish brown; 1st flagellar segment about 2.3–2.6×length of 2nd (n=5). Mandibles orange, darkened towards apex, sometimes with obscure blackish brown marking; right mandible with incision between apical and middle teeth much deeper than incision between middle and basal teeth, inner lobe of basal tooth usually rounded; left mandible without middle tooth. Pronotum and cervical sclerite mostly or entirely dark orange, prosternum black; mesonotum and metanotum black, with extensive dark orange areas; anterior half of mesoscutal lateral lobe with large dark orange marking; mesopleuron and metapleuron black, rarely with dark orange marks. Tarsal claws without angled basal lobe. Forewing slightly brownish, with apical 2/5 distinctly darkened; stigma black in apical 1/2–2/3 and pale orange in basal 1/2–1/3 and often along anterior margin; veins black, veins C, Sc, R and veins in basal part partly pale brown; cell C pilose all over. Abdomen dark orange, with 6th to 9th terga, 7th sternum, and often propodeum black. Sawsheath as in Fig. 10C.

Male. Length 8–10.5 mm. Supraocular stripe missing; upper frons very strongly swollen, without distinct punctures, entirely glabrous; facial crest very strongly convex, carinate, glabrous. Antenna with scape and pedicel pale yellow; apical part of pedicel often marked with black; flagellum blackish brown, sometimes, particularly in basal segments, partly pale brown to yellow; 1st flagellar segment about 2.3–2.9×length of 2nd (n=100, 80% are 2.5–2.8). Mandibles pale yellow, rufous at apex; inner tooth usually marked with black; right mandible very deep, much deeper than incision between middle and basal teeth; left mandible without middle tooth. Mesonotum usually entirely black; rarely mesoscutum, mesoscutellum, metascutum and metascutellum with brownish marking; ventral side of thorax pale yellow. Forewing subhyaline, very slightly brownish, usually with large obscure cloud under stigma; stigma with basal part pale yellow and apical part and anterior and posterior margins black; cell C pilose, rarely partly glabrous. Dorsal side of abdomen black, usually 4th and 5th (sometimes also 2nd and 3rd) segments largely orange; ventral side entirely pale yellow. Apex of subgenital plate narrowly truncate. Genitalia as in Figs. 14, 15C.

Distribution. China (Shaanxi) (Fig. 7).

Type material examined. Holotype (Fig. 2 C–D): ♀, "[Shaanxi: Fuping-x.], Liangfengya, 2000–2100 m, 12 km WNW Longcaoping, 24 Jun. 1997, T Yagi" "Holotype, *Pamphilius nitidiceps* Shinohara, 1998" (IZB).

Other material examined (4♀541♂). CHINA: Shaanxi: 20♂, Kaitianguan, 2000 m, 34°00′N 107°51′E, Mt. Taibaishan, Qinling Mountains, 5-7.VI.2004, A. Shinohara (NSMT); 9♂, same except 21.V.2005 (NSMT); 2♀14♂, same except 24.V.2005 (NSMT); 1♀76♂, same except 27.V.2005 (NSMT); 1♀60♂, same except 30.V.2005 (NSMT); 54♂, same except 1.VI.2005 (NSMT); 67♂(7 in ethanol), same except 29.V.2006 (NSMT); 67♂(1 in ethanol), same except 30.V.2006 (NSMT); 1♂, same except 1.VI.2006 (NSMT); 36♂, same except 2.VI.2006 (NSMT); 1♂, same except 3.VI.2006 (NSMT); 107♂(1 in ethanol), same except 8.VI.2006 (NSMT); 1♂, same except 9.VI.2006 (NSMT); 29♂(2 in ethanol), same except 10.VI.2006 (NSMT).

Host plant. Unknown.

Remarks. This species superficially resembles *P. takeuchii* in both sexes but is easily distinguished from it by the bidentate left mandible (Fig. 4A) and the tridentate right mandible with a very deep incision between the middle and apical teeth (Fig. 4B). Those apparently modified

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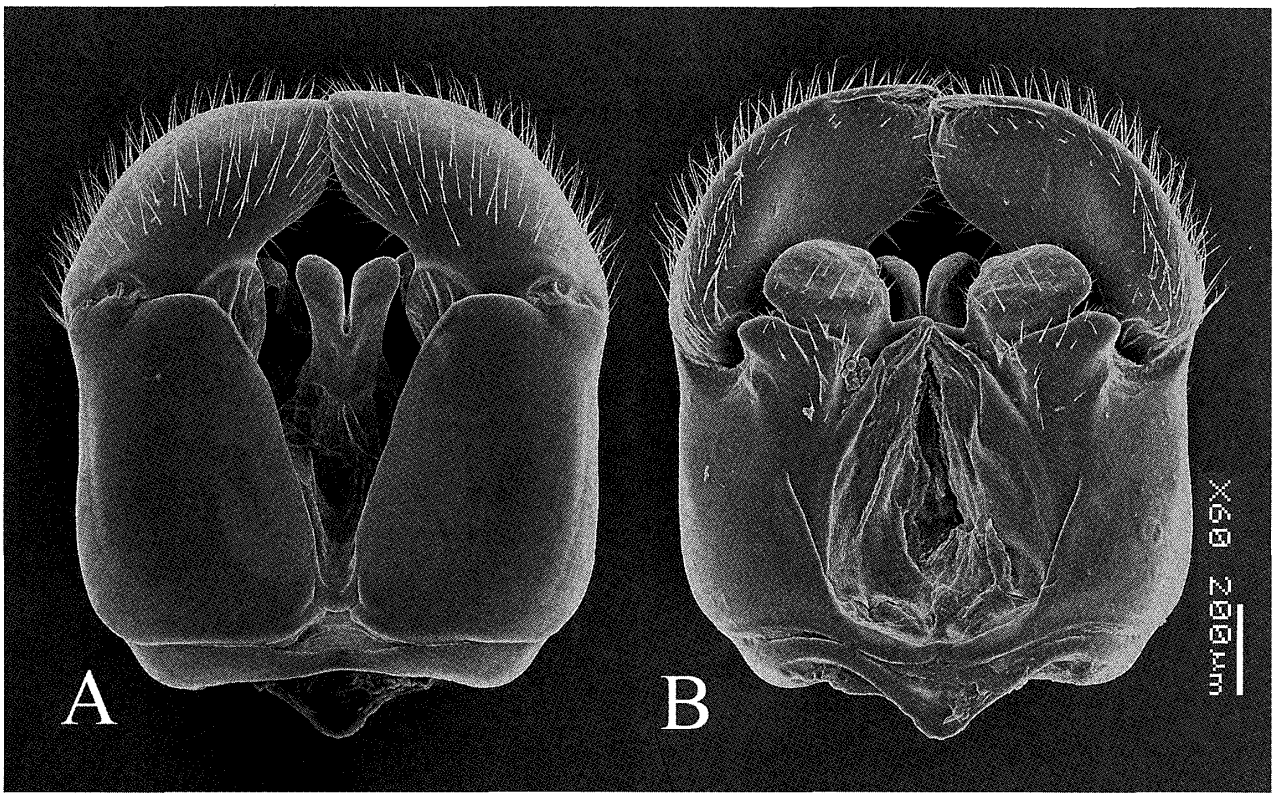

Fig. 14. *Pamphilius nitidiceps*, male genitalia, Mt. Taibaishan, Shaanxi, China.

mandibles are known only for *P. nitidiceps* and *P. politiceps* within the *komonensis* complex.

Pamphilius nitidiceps was known only by the female holotype. The male is described here for the first time. The four newly obtained females are 9–11 mm long (holotype 11 mm), with the POL/OOL ratio varying from 1.9 to 2.2 (holotype 2.0). In those specimens, the head, the pronotum, the cervical sclerite, and the triangular mark on the mesoscutal median lobe are dark orange, the anterior half of the mesoscutal lateral lobe has large dark orange marks, and the forewing has a rather distinct cloud below the stigma. Shinohara & Yuan (2004) used these characters for separating *P. nitidiceps* from *P. politiceps* and now they have been found stable after studying the additional material, though the available material is still quite limited. On the other hand, the shape of the right mandible and the coloration of the mandibles, also used as distinguishing characters, may be variable or at least the differences are not easy to recognize in some cases. The inner lobe of the basal tooth of the right mandible is comparatively low and rounded in *P. nitidiceps*, whereas it is angularly produced in *P. politiceps* (see Shinohara & Yuan, 2004); however, the additional specimens show small but certain variations and the alluded difference is not always very clear. In *P. nitidiceps*, the mandibles are dark orange without dark marks in three specimens including the holotype, while the apical halves of the mandibles have obscure blackish brown marks in the remaining two specimens. In the holotype of *P. politiceps*, the apical halves of the mandibles are largely black.

Pamphilius politiceps Shinohara & Yuan, 2004

(Figs. 2E–F, 7, 10 D, 16 A)

Pamphilius politiceps Shinohara & Yuan, 2004: 184.

Female. Length 9.5 mm. Head creamy white, with black spot covering ocellar and postocellar areas (Fig. 16A); frons, lateral postocular area, large areas just outside of postocellar area, and

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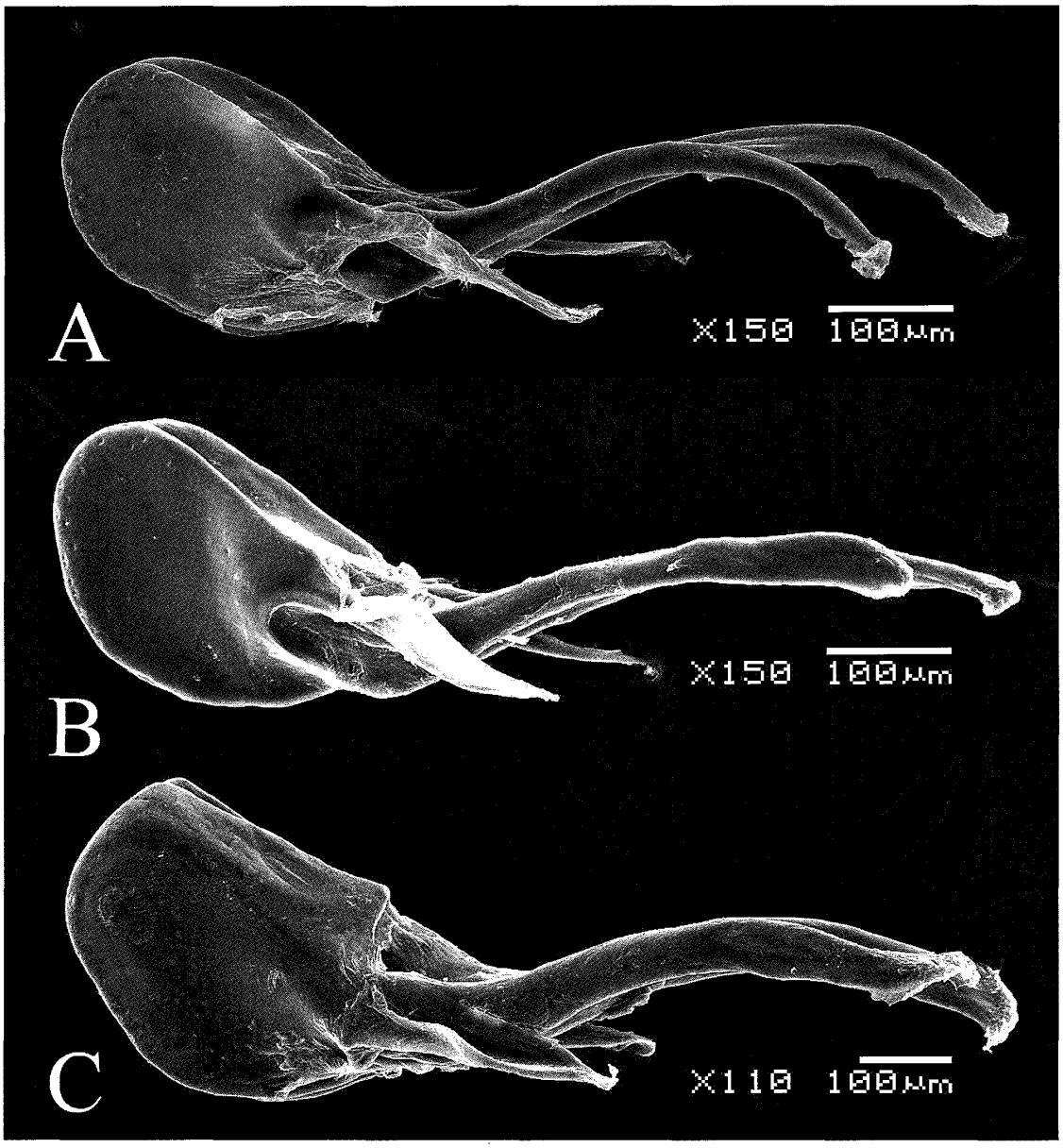

Fig. 15. *Pamphilius* spp., penis valves, lateral view.—A, *P. komonensis*, Mt. Ishizuchiyama, Japan; B, *P. kyutekparki*, Mt. Odaesan, Korea; C, *P. nitidiceps*, Mt. Taibaishan, Shaanxi, China.

posterior central part of postocellar area tinted with orange; upper frons strongly swollen, with shallow median notch, without distinct punctures; facial crest strongly inflated, rounded, not continuous to ridge on inner orbit. Antenna creamy white; scape and pedicel slightly brownish, and 9–10 terminal flagellar segments blackish; 1st flagellar segment about 2.4×length of 2nd (n=1). Mandibles creamy white in basal half and black in apical half, with cutting edge rufous; right mandible with incision between apical and middle teeth much deeper than incision between middle and basal teeth, inner lobe of basal tooth angular; left mandible without middle tooth. Prothorax black, with large pale orange areas; mesothorax and metathorax black, with mesoscutellum (except for anterior 1/3), and metascutellum pale orange, and posterior half of mesoscutal median lobe, large spot in posterior part of mesoscutal lateral lobe (connected with pale area on mesoscutellum), posttergite, large mark on metascutum, anterior margin of metapostnotum, and large marks on metepimeron creamy white. Tarsal claws without angled basal

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lobe. Forewing slightly brownish, with apical 1/3 faintly clouded; stigma with anterobasal 1/2 creamy white and posteroapical 1/2 black; veins blackish brown, with veins C and Sc and base of vein R creamy white; cell C pilose all over. Abdomen pale orange, with propodeum and 6th to 9th segments black. Sawsheath as in Fig. 10 D.

Male. Unknown.

Distribution. China (Guangxi) (Fig. 7).

Type material examined. Holotype (Fig. 2 E–F): ♀ "Guangxi, Jinxiu, Jinzhong Gonglu, 1000 m, 1999. V. 19, Zhang Xuezhong" "IOZ(E) 601043" "Holotype, *Pamphilius politiceps* Shinohara & Yuan, 2004" (IZB).

Host plant. Unknown.

Remarks. This species is very closely allied to *P. nitidiceps*, but differs from it in the points discussed under the latter species. *Pamphilius politiceps* is known only by the female holotype from Jinxiu, Guangxi, China. Jinxiu County, situated at about 24–25°N, is probably the southernmost locality within the known range of the genus *Pamphilius*.

Pamphilius uniformis sp. nov.

(Figs. 1G–H, 3G–H, 4C–D, 7, 10E, 11D, 16B, 17, 20A)

Female. Length 11–12 mm. Head pale yellow, with most of ventral surface behind level of facial crests and paired small spots on frons between antennal sockets black. Upper frons strongly swollen, with deep broad median notch, without distinct punctures; facial crest strongly inflated, carinate, and continuous to ridge on inner orbit. Antenna pale yellow, becoming blackish towards apex; 1st flagellar segment about 2.5–2.7×length of 2nd (n=5). Mandibles pale yellow, with inner surface and apical half black; right mandible with incision between apical and middle teeth about as deep as incision between middle and basal teeth, inner lobe of basal tooth rounded; left mandible with distinct middle tooth. Dorsal surface of thorax, including all mesonotum and metanotum black; lateral and ventral surface of thorax pale yellow, except for prosternum, pseudosternum, and narrow ventral margins of mesepimeron and metepimeron. Tarsal claws without angled basal lobe. Forewing slightly brownish, without distinct cloud; stigma brown to blackish brown; veins blackish brown, veins C and Sc pale brown; cell C glabrous. Abdomen black dorsally, with 2nd–5th segments medially orange, and entirely pale yellow ventrally. Sawsheath as in Fig. 10E.

Male. Length 9–11 mm. Supraocular stripe usually absent (rarely dark orange supraocular stripe present); upper frons very strongly swollen, without distinct punctures, entirely glabrous; facial crest very strongly convex, carinate, glabrous. Antenna pale yellow, becoming blackish brown towards apex; basal flagellar segments not blackish; 1st flagellar segment about 2.1–2.6×length of 2nd (n=32, 87% are 2.3–2.5). Mandibles pale yellow, rufous at apex, inner half largely black; right mandible with incision between apical and middle teeth, rather shallow, at most as deep as incision between middle and basal teeth; left mandible with distinct middle tooth. Mesoscutum entirely black, rarely with small obscure pale yellow spot on lateral lobe near mesoscutellum; mesoscutellum usually entirely black, rarely marked with pale yellow; metascutellum black, often pale yellow; ventral side of thorax pale yellow. Forewing subhyaline, sometimes brownish but rather lightly, without cloud in apical 1/3; stigma dull orange or pale brown, with anterior and posterior margins darkened; cell C usually partly pilose, sometimes entirely pilose or glabrous. Dorsal side of abdomen black, often with median orange areas, or rarely almost entirely orange; ventral side entirely pale yellow. Apex of subgenital plate usually rounded. Genitalia as in Fig. 17.

Distribution. China (Shaanxi) (Fig. 7).

Type material examined. Holotype (Fig. 3 G–H): ♂, Kaitianguan, 2000 m, 34°00′N 107°51′E, Mt. Taibaishan, Qinling Mountains, Shaanxi, China, 5-7.VI.2004, A. Shinohara (IZB). Paratypes (5♀31♂): CHINA: Shaanxi: 1♀, same as for holotype except 31.V–2. VI.2004, A. Shinohara (NSMT); 2♀21♂, same

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as for holotype (NSMT); 2♂, same except 21.V.2005 (NSMT); 1♂, same except 24.V.2005 (NSMT); 3♂, same except 27.V.2005 (NSMT); 3♂, same except 1.VI.2005 (NSMT); 1♀, same except 1.VI.2006 (NSMT); 1♀(in ethanol), same except 7.VI.2006 (NSMT); 1♂, same except 9.VI.2006 (NSMT).

Host plant. Unknown.

Etymology. The species epithet refers to the rather uniform color patterns of the male and female of the new species.

Remarks. This species is peculiar especially in the coloration of the female. The female has the largely black dorsal surfaces of the head, thorax and abdomen and, in contrast, the largely pale yellow frontal surface and gena of the head and ventral surfaces of the thorax and abdomen (Fig. 1G–H). This general color pattern is unusual for a *Pamphilius* female and gives a male-like appearance particularly in life. The female is thus easily distinguished from those of the related species by the color pattern. The stout sawsheath peg (Fig. 10E) is also very characteristic. On the other hand, the coloration of the male is generally of a normal *Pamphilius* type. The male closely resembles those of *P. takeuchii* and *P. nitidiceps*, but is separated from these by the characters given in the key.

At the type locality of *P. uniformis*, adults of *P. nitidiceps* were also found even on the foliage of the same tree.

Pamphilius takeuchii Beneš, 1972

(Figs. 1I–J, 2G–H, 3I–J, 8, 10F, 11 E, 16C–E, 18, 20B)

Pamphilius jucundus Takeuchi, 1930 (not Eversmann, 1847): 16; Togashi, 1954: 5; Takeuchi, 1955: 114; Togashi, 1961: 29; Okutani, 1965: 467; Togashi, 1970: 54; Togashi, 1972: 55; Togashi, 1973: 25; Kondo & Miyake, 1976: 5; Yamada, 1976: 177.

Pamphilius (*Pamphilius*) *jucundus*: Klima, 1937: 43.

Pamphilius (*Anoplolyda*) *jucundus*: Takeuchi, 1938: 224; Togashi, 1965: 243.

Pamphilius takeuchii Beneš, 1972a: 46 (new name for *P. jucundus* Takeuchi, 1930); Okutani, 1972: 15; Beneš, 1974: 309; Okutani, 1974: 193; Okutani, 1977: 288; Shinohara, 1979: 152; Shinohara & Okutani, 1983: 279; Murota & Kurokawa, 1985: 247; Abe & Togashi, 1989: 542; Shinohara, 1991: 56; Enoki & Nakamura, 1993: 11; Nakamura & Enoki, 1997: 559; Shinohara, 1998b: 242; Togashi, 1998: 253; Haneda *et al*., 1998: 315; Nambu, 1998: 17; Togashi & Yamamoto, 2000: 706; Shinohara, 2002a: 425; Shinohara, 2002b: 191; Shinohara, 2004: 263; Nagase, 2004: 1244; Naito *et al*., 2004: 9; Shinohara & Yamada, 2005: 59; Shinohara & Hara, 2005: 274; Yoshida, 2006: 21.

Female. Length 9–13 mm. Head usually dark orange, with clypeus and supraocular stripe pale yellow and large mark covering ocellar and postocellar areas black (Fig. 16D); in very pale specimens, black mark almost missing (Fig. 16E); in extremely dark specimens, head black with only clypeus and supraocular stripe pale yellow; upper frons strongly swollen, usually with shallow but distinct notch and without distinct punctures; facial crest strongly inflated, carinate, and continuous to ridge on inner orbit. Antenna pale yellow, with flagellar segments beyond 4th–8th blackish; 1st flagellar segment about 1.9–3.0×length of 2nd (n=112, 77% are 2.4–2.7, 47% are 2.4–2.5). Mandibles pale yellow, usually with large black marking, often mostly pale yellow; right mandible with incision between apical and middle teeth about as deep as incision between middle and basal teeth, inner lobe of basal tooth roundly produced; left mandible with distinct middle tooth. Thorax black, with only spot at posterior part of mesoscutal lateral lobe, mesoscutellum and metascutellum pale yellow in very dark specimens, usually pronotum, mesoscutum and metascutum with various amount of dark orange (and often also pale yellow) marks; in very pale specimens, pronotum, mesoscutum and metascutum mostly dark orange and cervical sclerite and anterior margin of mesepisternum also marked with orange. Tarsal claws without

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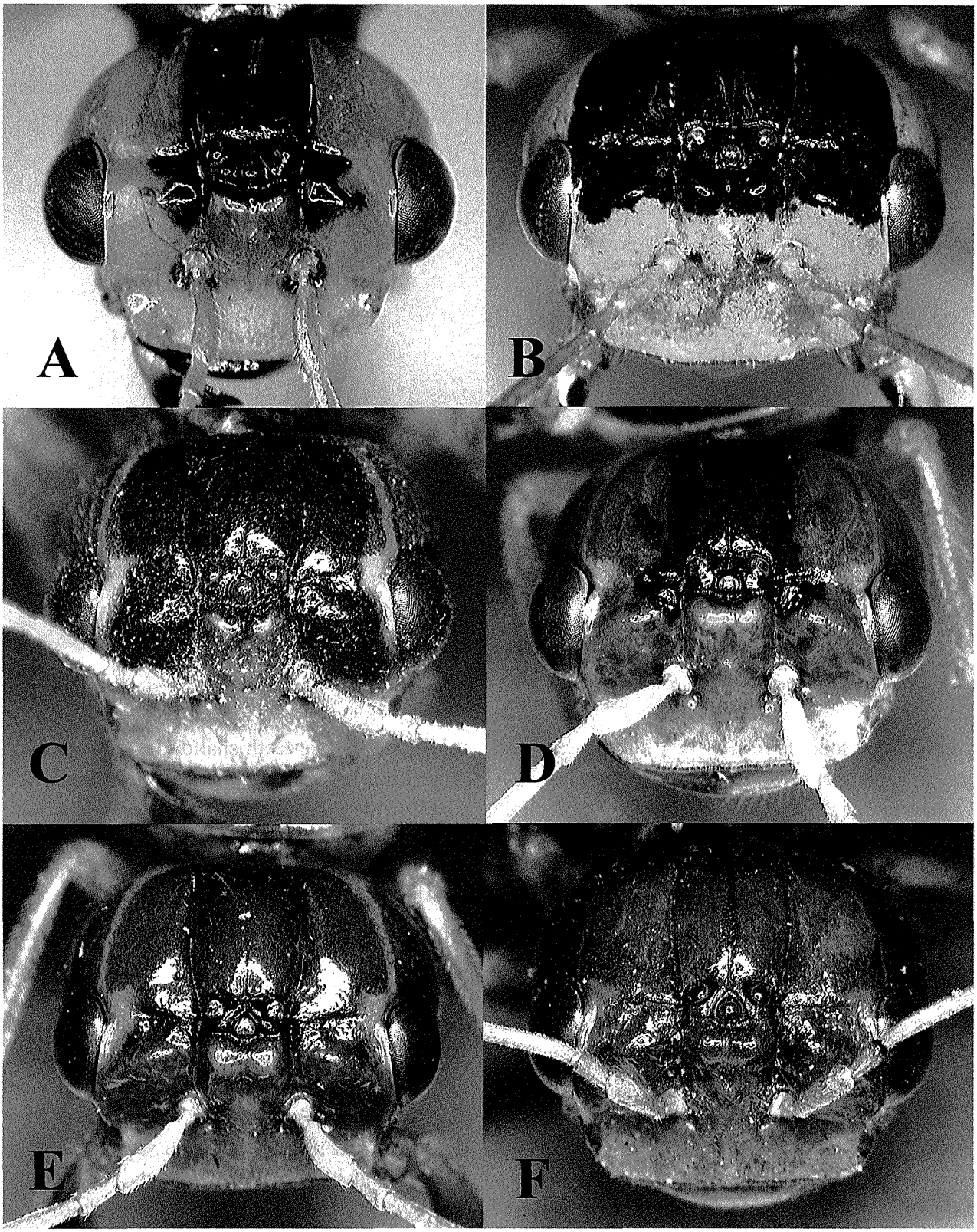

Fig. 16. *Pamphilius* spp., heads, dorsofrontal view, females.—A, *P. politiceps*, holotype; B, *P. uniformis*, paratype, Mt. Taibaishan, Shaanxi, China; C, *P. takeuchii*, holotype; D, do., Mt. Daisen, Japan; E, do., Yatsugatake Mts., Japan; F, *P. croceus*, Spassk, Russia.

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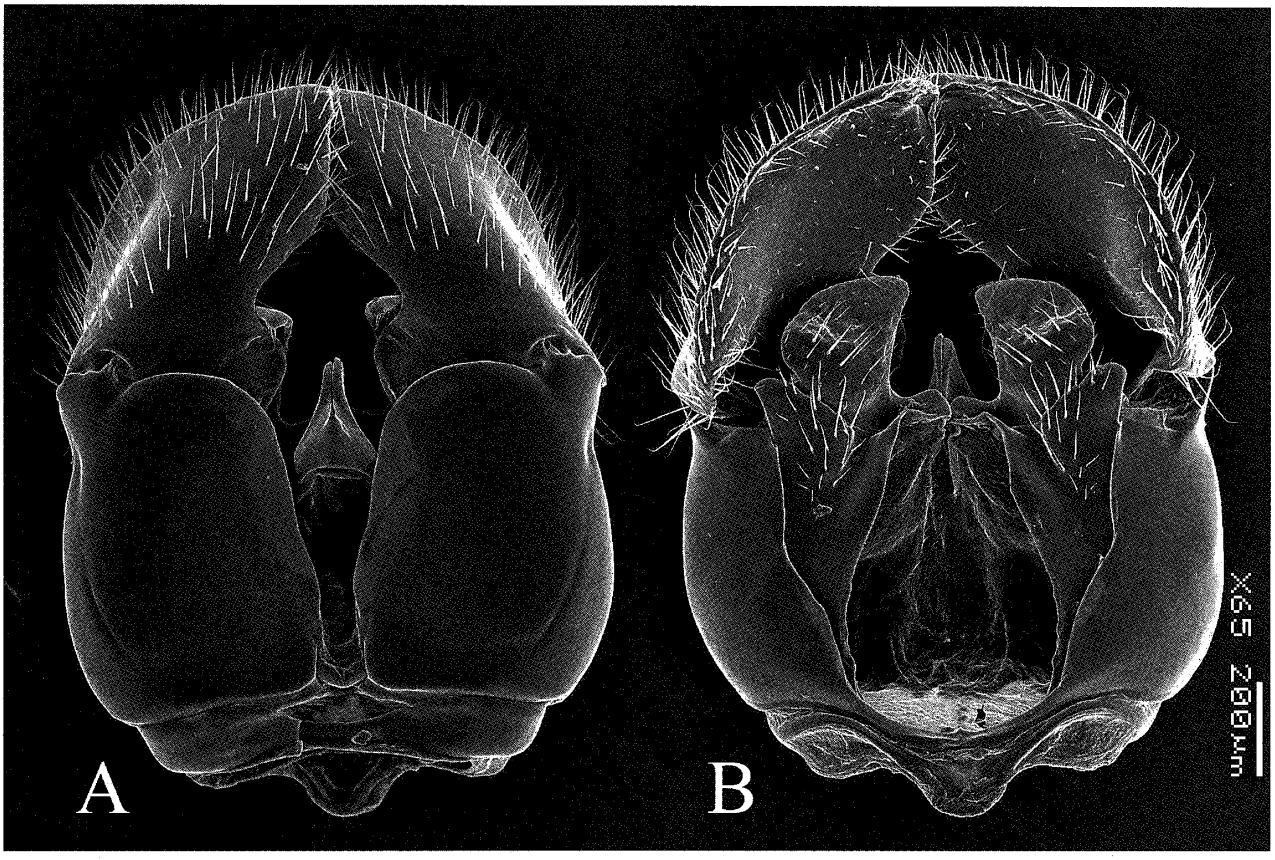

Fig. 17. *Pamphilius uniformis*, male genitalia, Mt. Taibaishan, Shaanxi, China.

angled basal lobe. Forewing very slightly brownish, with distinct cloud in apical 2/5; veins usually mostly blackish brown (veins C, Sc, R and basal parts of M+Cu1 and anal veins often yellowish); stigma pale yellow, with posterior apical part blackish; cell C usually pilose all over (about 20% of 113 specimens examined are glabrous or nearly so). Abdomen orange, usually with 6th and more posterior segments black; often propodeum and rarely 5th tergum also marked with black. Sawsheath as in Fig. 10F.

Male. Length 8–12 mm. Supraocular stripe absent; upper frons very strongly swollen, without distinct punctures, entirely glabrous; facial crest very strongly convex, carinate, glabrous. Antenna with scape and pedicel pale yellow; pedicel often darkened apically; flagellum dark to blackish brown, further darkened towards apex; 1st flagellar segment about 2.3–2.9×length of 2nd (n=100, 75% are 2.5–2.7). Mandibles pale yellow, rufous at apex, often with blackish mark on inner teeth; right mandible with incision between apical and middle teeth shallow, at most as deep as incision between middle and basal teeth; left mandible with distinct middle tooth. Mesonotum and metanotum usually entirely black; mesoscutellum, and metascutellum very often and mesoscutal median lobe sometimes marked with pale yellow in specimens from higher mountains in Honshu; ventral side of thorax pale yellow. Forewing subhyaline, sometimes brownish but rather lightly, usually with obscure cloud in apical 1/3; stigma pale yellow basally and blackish brown apically and at anterior and posterior margins; cell C usually glabrous in specimens from Hokkaido and usually pilose in specimens from other localities. Dorsal side of abdomen black, usually with orange areas on 4th and 5th segments (rarely 2nd to 6th segments mostly orange dorsally); ventral side entirely pale yellow. Apex of subgenital plate very broadly rounded. Genitalia as in Figs. 18, 20B.

Distribution. Japan (Hokkaido, Honshu, Shikoku, Kyushu) (Fig. 8). Zhelochovtsev & Zi-

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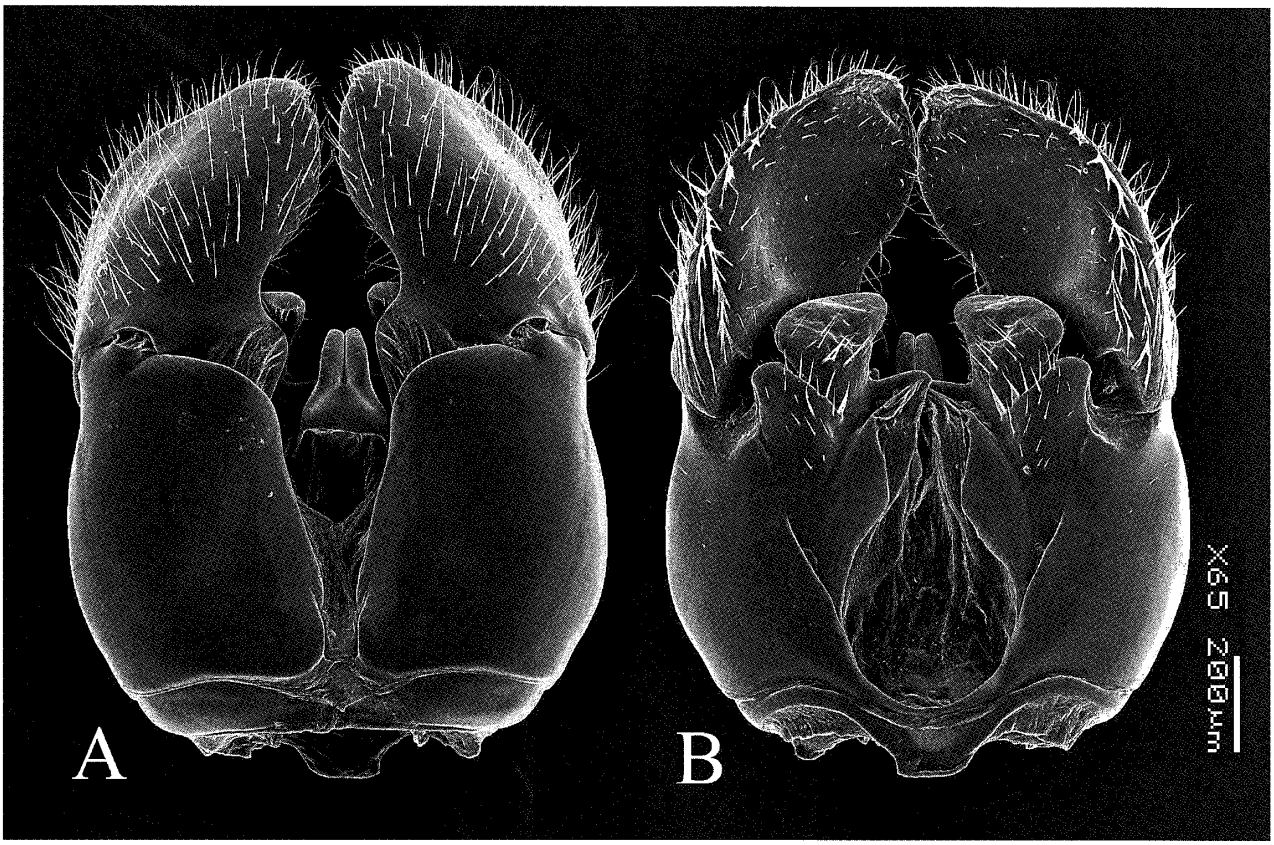

Fig. 18. *Pamphilius takeuchii*, male genitalia, Mt. Ishizuchiyama, Japan.

novjev's (1995) record of *P. takeuchii* from Russia is erroneous.

Type material examined. Holotype (Fig. 2G–H): ♀, "Mt. Tsurugi, Tokushimaken, June 3, 1930, K. Takeuchi" "*Pamphilius jucundus* Take., Holotype" (OPU). Paratypes (2♀): JAPAN: Nara Pref.: 1♀, "Yoshino, June 2, 1916" (OPU). Tottori Pref.: 1♀, "Daisen, July 15, 1920, K. Takeuchi" (OPU).

Other material examined (179♀743♂). HOKKAIDO: Abashiri Subpref.: 1♀, Midori, Kiyosato, 15. VII. 1998, H. Hara (NSMT). Hidaka/Tokachi Subprefs.: 1♂, Nissho-toge, 1100 m, 19. VI. 2004, A. Shinohara (NSMT). Sorachi Subpref.: 1♀, Bibai, larva on *Acer mono*, coll. 11. VII. 1995, matured 27. VII., emerged 2. IV. 1996, H. Hara (NSMT); 1♀, Bibai, larva on *Acer mono*, coll. 12. VII. 1995, matured 25. VII., emerged 1. IV. 1996, H. Hara (NSMT). Ishikari Subpref.: 1♀, Sapporo, 6.VI.1959, T. Kumata (HU); 1♀, Maruyama, Sapporo, 6.VI.1956, K. Kamijo (HU); 1♀, same except 18.VII.1956, M. Okada (EU); 1♀, same except S. Ueda (EU); 1♀, Nopporo, Sapporo, 8.VI.1985, M. Abe (NSMT); 1♂, Suigenchi, Otaru, 30. VI. 1954, T. Kumata (HU); 1♀, Jozankei, VII. 1917, A. Nohira (OMNH); 1♀, Morappu, Shikotsu-ko, 16. VI. 1984, A. Shinohara (NSMT); 1♀, Shikotsu-ko, 17. VI. 1996, A. Shinohara (NSMT); 1♀, same except 19. VI. 2003 (NSMT). Shiribeshi Subpref.: 3♂, Nakayama-toge, 800 m, 27–30. VI. 1992, A. Shinohara (NSMT); 1♂, same except 8. VII. 1996 (NSMT); 1♂, same except 20. VI. 1997 (NSMT). HONSHU: Aomori Pref.: 1♂, Mt. Hakkoda, 29. VI. 1995, M. Yamada (MYC); 1♂, Mt. Kamafuse, Mutsu, 12. VI. 1997, M. Yamada (MYC); 1♀, Omagoshi, Iwasaki, 2. VI. 1999, M. Yamada (MYC); 1♂, Sukayu, Aomori, 22. VI. 1995, M. Yamada (MYC); 1♀, Juniko, Iwasaki, 16. VI. 1985, M. Yamada (MYC); 1♀, same except 23. VII. 1988 (MYC). Iwate Pref.: 11♂, Tsunagi spa, 29. V. 1982, A. Shinohara (NSMT). Miyagi Pref.: 1♂, Mt. Maeyama, Zawo Mts., 23. VI. 1974, K. Shirahata (NSMT). Yama-

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gata Pref.: 1♀, Mt. Gassan, 19.VI.1960, K. Shirahata (NSMT); 1♀, Biruzawa, nr. Takahata, 6. VI. 1944, A. Suzuki (KU). Fukushima Pref.: 1♀, Takino, Fukushima-city, 29. VII. 1984, T. Oku (NSMT); 1♀, Mt. Azuma, 19. VII. 1959, K. Sato (NSMT); 1♀, Akane-rindo, Haranomachi, 8. VI. 1980, S. Tsuyuki (NSMT); 1♀, Shyowa v., 19. VIII. 1992, T. Nambu (NSMT); 1♀, nr. Miyadoko bog, Nango Village, 31. V. 2003, S. Tsuyuki (NSMT). Tochigi Pref.: 1♀, Nikko, Yumoto, 1700 m, 27. VII. 1993, A. Shinohara (NSMT). Gunma Pref.: 1♀, Marunuma, 1400 m, 8–9. VI. 2001, A. Shinohara (NSMT). Saitama Pref.: 1♀, Asuwa, Moroyama, 27.V.1990, M. Uchida (NSMT); 1♀, Kenmin-no-mori, Maruyama, Yokoze-machi, 12.V.2001, A. Ishizuka (NSMT). Tokyo Met.: 1♀, Mt. Takao, 3. VI. 1933, K. Sato (NSMT); 1♀, Mt. Takaosan, 27.V.1919, K. Sato (NSMT); 1♂, Kamiange, Mt. Jinbayama, 400 m, 11.V.1973, A. Shinohara (NSMT); 4♂, same except 20.V.1973 (NSMT); 1♂, same except 25.V.1973 (NSMT); 2♂, same except 18.V.1974 (NSMT); 2♂, same except 12.V.1974 (NSMT); 1♂, same except 8.V.1977 (NSMT); 1♂, same except 8.V.1977, N. Matsuba (NSMT); 1♂, same except 15.V.1977 (NSMT); 1♂, same except 21.V.1977, A. Shinohara (NSMT); 3♂, same except 14.V.1978 (NSMT); 1♀, same except 1.V.1979, N. Matsuba (NSMT); 5♂, same except 3.V.1979, A. Shinohara (NSMT); 1♂, same except 5.V.1979 (NSMT); 4♂, same except 6.V.1991 (NSMT); 1♀4♂, same except 25.V.1996, A. & T. Shinohara (NSMT); 4♂, same except 29. IV. 1998, A. Shinohara (NSMT); 4♂, same except 7.V.1998 (NSMT); 1♂, same except 29. IV. 2002 (NSMT); 2♂, same except 5. V. 2002 (NSMT); 3♂, Mt. Mitakesan, Okutama, 17.V.1988, A. Shinohara (NSMT). Kanagawa Pref.: 1♀, Mt. Komagatake, 1100–1300 m, Hakone-machi, 5. VI. 2004, H. Nagase (HNC); 1♀, Mt. Komagatake, 1100 m, Hakone-machi, 28. VI. 2005, H. Nagase (HNC); 1♀, Minoge–Yabitsu-toge, Hadano-shi, 24. V. 1972, H. Suda (HSC). Niigata Pref.: 1♂, Narumi-yama, N. Echigo, 19. VI. 1968, K. Baba (KU); 1♀, Yunodaira, Shibata city, 25. VI. 1993, H. Itami (NSMT); 1♀, Oishi Dam, Sekikawa-mura, 19.VI.2004, H. Itami (NSMT); 1♂, Hiuchi-toge, 23. VI. 1983, A. Shinohara (NSMT); 1♀, Mantaro-dani, Tsuchitaru, 6. VI. 1984, A. Shinohara (NSMT); 1♀, Mt. Tairappyo, 25. VII. 1984, T. Nambu (NSMT); 1♀, Santakoyama, Nakazato, 17. VI. 1987, M. Kobayashi (NSMT) ; 1♀, Mt. Amakazariyama, 9.VIII.1980, H. Kumamoto (HKC); 1♂, Renge-onsen, Itoigawa, 24. VII. 1984, A. Shinohara (NSMT). Ishikawa Pref.: 1♀, Haraidani, Okuchi-mura, 22. VI. 1988, I. Togashi (NSMT); 1♀, Waridani, 3.VI.1966, I. Togashi (NSMT); 1♀, Okuike, 13.VI.1966, I. Togashi (NSMT); 1♂, Kamitsudani, Shiramine-M., 1.VI.1972, I. Togashi (NSMT); 1♂, Mt. Hakusan, 1300–1500 m, 6.VI.1994, I. Togashi (NSMT); 1♀, same except 17.VI.1994 (NSMT); 1♂, same except 12.VII.1996 (NSMT); 1♀, Mt. Hakusan, Sabo-do, 14.VI.1997, I. Togashi (NSMT). Fukui Pref.: 1♂, Kinome-toge, Imajo-cho, 31.V.1987 (NSMT) ; 1♀, Mt. Hekoyama, Ikeda-cho, 16.VI.1981, T. Murota (NSMT); 1♂, Shinjo, Mihama, 24.V.1977, T. Murota (NSMT); 1♀, Koike-Oono, 8.VI.1980, T. Tano (NSMT); 1♀, Mt. Arashima-dake, Oono-shi, 6.VI.1982, T. Tano (NSMT); 1♀, Mushi-dani, Natasho-mura, 9.V.1982, T. Murota (NSMT) ; 1♀, Nyu-dani, Izumi-mura, 27.V.1982, T. Murota (NSMT); 2♂, Mt. Kyogadake, Katsuyama City, 29.V.1982, T. Murota (NSMT) ; 1♂, Taniyama, Oono-shi, 9.V.1982, H. Kurokawa (NSMT). Yamanashi Pref.: 1♀, Yashajin, 15. VII. 1966, S. Takagi (HU); 1♀, Narusawa, Fuji-rindo, 18. VI. 1988, K. Mizuno (NSMT); 1♀, Sankodai–Mt. Ashiwada, 19.VII.1992, H. Takahashi (NSMT); 1♀, Kouyoudai, 7.VI.2002, H. Takahashi (NSMT); 1♂, Saihara, Uenohara, 27. IV. 1991, H. Suda (HSC). Nagano Pref.: 1♀, Tsugaike, Mt. Hakubadake, 6–8. VIII. 1999, A. Shinohara (NSMT); 1♀, same except 26. VIII. 2002 (NSMT); 1♀, Nanakurasawa–Yumata, Oomachi-shi, 4.VII.1982, S. Yoshimatsu (NSMT); 1♂, Ogisawa, 1600 m, 23. VII. 1981, A. Shinohara (NSMT); 2♀, Nakabusa-onsen, Hotaka, 11. VIII. 1976, H. Suda (HSC); 1♀1♂, Yarisawa, Kamikochi, 1600–1900 m, 18–20.22. VII. 1989,

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A. Shinohara (NSMT); 1♀1♂, Karasawa, 9–10. VII. 1963, T. Saigusa (KU); 4♀56♂, Karasawa, Kamikochi, 2100–2500 m, 1–3. VIII. 1990, A. Shinohara (NSMT); 1♂, Kiso-Outaki, 5. VII. 1984, H. Hara (NSMT); 1♀5♂, Shimashima-dani, 1700–1800 m, 28–29. VI. 1976, A. Shinohara (NSMT); 1♀5♂, Oshirakawa-rindo, Azumi-mura, 4–6. VI. 1990, A. Shinohara (NSMT); 1♀5♂, Mt. Norikuradake, 24–25. VII. 1981, A. Shinohara (NSMT); 2♂, Ina, Uchinokaya, 11. VI. 1968, T. Naito (KU); 1♀, Nakanoyu, Mt. Ontake, 1600 m, 21. VII. 1981, A. Shinohara (NSMT); 4♂, Nakanoyu, Mt. Ontake, Kiso-gun, 1600 m, 4. VII. 1997, H. Hara (NSMT); 1♀, Nakabata, Kiso-Fukushima, 750 m, 11. VI. 2001, F. Taama (NSMT); 1♀, Yamanouchi-machi, 8.VIII.1981, H. Hara (NSMT); 1♀, Mt. Omeshi-dake, 4.VII.2003, H. Kojima (NSMT); 6♂, Shichimi-onsen, 3–4. VI. 1985, A. Shinohara (NSMT); 5♂, same except 4–5. VI. 1988 (NSMT); 7♂, Misayama-toge, nr. Kakeyu, 29.V.1981, A. Shinohara (NSMT); 1♀, Tobira spa, 31.VII.1973, S. Hisamatsu (EU); 1♀12♂, Shibunoyu, Yatsugatake Mts., 4–5. VII. 1978, A. Shinohara (NSMT); 1♂, Minoto, Yatsugatake Mts., 1800–1900 m, 18. VII. 1980, A. Shinohara (NSMT); 3♀1♂, same except 25–26. VII. 1980 (NSMT); 3♀1♂, same except 29–31. VII. 1982 (NSMT); 3♀5♂, same except 5–7. VIII. 1982 (NSMT); 2♀, same except 2. VIII. 1984 (NSMT); 5♀7♂, same except 29. VII.-3. VIII. 1986 (NSMT); 8♀, same except 4–8. VIII. 1987 (NSMT); 2♀1♂, same except 4–8. VIII. 1988, A. Shinohara (NSMT); 2♀58♂, same except 23–26. VII. 1996 (NSMT); 3♀28♂, same except 31. VII.–3. VIII. 1997 (NSMT); 3♀61♂, same except 27–31. VII. 1999 (NSMT); 1♀62♂, same except 25–29. VII. 2000 (NSMT); 1♂, Nyugasa, 4. VII. 1978, N. Hirose (KU); 1♀, Namiai v., Jatougeyama, Umanose, 5.VIII.2000, R. Matsumoto (OMNH). Shizuoka/Yamanashi Prefs.: 2♀, Mt. Fujisan, 23.VII.1961, K. Kojima (NSMT). Shizuoka Pref.: 1♀, Awakura, Tenshokyo, Fujinomiya, 1000 m, 25.V.1989, H. Ishikawa (NSMT); 1♀, Abe Pass, Shizuoka-shi, 20. VII.1994, H. Nagase (HNC); 1♀, Ikawa Pass, Shizuoka City, 19.VIII.2005, Y. Hirai (NSMT). Gifu Pref.: 1♂, Takayama, 20.V.1979, A. Shinohara (NSMT); 1♀, (?)Ena, 4. VI. 1935 (NSMT). Aichi Pref.: 1♀, Shitara, Uradani (Beech forest), 900 m, 4–10. VII. 1994, K. Yamagishi (NSMT); 1♀, Uradani, Shidara-cho, 7. VI. 1994, S. Hashimoto (NSMT); 1♀, Mt. Chausu-yama, Goshodaira, Kitashidara-gun, 14–15.VI.1974, S. Ohkusa (NSMT). Shiga Pref.: 2♀, Kozuhara, 5.VI.1982, H. Kumamoto (HKC); 1♀, Mt. Ibuki-san, 26.VI.1977, H. Kumamoto (HKC); 1♀, same except 27.V.1978 (HKC); 1♀, same except 22.VI.1980 (HKC); 1♂, Mt. Ibukisan, 22.V.2003, H. Kojima (NSMT); 1♀, Kita-Hira, 1000 m, Shiga-machi, Shiga-gun, 1.VII.2001, H. Yoshida (HYC); 2♀, "Shiga t., Hirasan–Yakumo-gahara", 16.VI.1999, R. Matsumoto (OMNH). Kyoto Pref.: 1♂, Omi, Ohara, 15. V.1984, R. Inagawa (NSMT); 1♂, Omi, Ohara, 16. VI. 1984, T. Matsumoto (NSMT); 1♂, Hacchodaira, 26. V. 1940, K. Takeuchi (OPU); 1♀, Sugi-toge, 7.VII.1970, H. Kumamoto (HKC); 1♀, Sugi-Pass, Kyoto-city, 1. VI. 1975, K. Mizuno (NSMT); 2♀, Hanase-toge, Sakyo-ku, Kyoto, 12.VI.1999, H. Yoshida (HYC). Nara Pref.: 5♂, Mt. Mitsumineyama, Mitsue-mura, 8. VI. 1986, K. Mizuno (NSMT); 1♀, Mt. Odaigahara, 15–16. VI. 1974, K. Mizuno (NSMT); 1♀, same except 3. VII. 1977 (NSMT). Osaka Pref.: 1♀, Mt. Izumikatsuragisan, "Zone A", 4.VI.2004, H. Yoshida (HYC). Hyogo Pref.: 1♀, Hataganaru, larva on *Acer mono*, 5. VII.1958, em. 10. V. 1959, T. Okutani (KU); 1♀, same locality, 28.V.1954, T. Okutani (KU); 1♀, Mt. Hyonosen, 6.VI.1966, T. Okutani (KU); 1♀, Mt. Oginosen, 9.VI.1963, T. Naito (KU); 1♂, Akasai-keikoku, 700 m, 26. V. 1992, T. Yagi (KU); 23♂, Akasai-keikoku, Haga-cho, 20–23.V.1999, A. Shinohara (NSMT); 1♀, same locality, 8. VI. 2000, T. Ikeda (MNHAH); 1♀, same locality, 20.V.2001, R. Matsumoto (OMNH); 1♀, Onzui, Haga-cho, 19.V.1968, T. Okutani (KU); 1♂, Kojo, Muraoka-cho, 14. V. 1991, T. Yagi (KU); 1♀, Takedao, Takarazuka-shi, 4. VI. 2002, T. Ikeda (MNHAH). Tottori Pref.: 1♀, Daisen, 17. V. 1932, K. Takeuchi, (OPU); 2♂, Yokotemichi, w. slope of Mt.

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Daisen, 1000 m, 20–25. V. 2000, A. Shinohara (NSMT); 3♂, same except 25–29. V. 2001 (NSMT); 1♀3♂, Ichinosawa, sw. slope of Mt. Daisen, 28. V. 2001, A. Shinohara (NSMT). Okayama Pref.: 1♀, Mt. Kenashiyama, Shinjo-mura, Maniwa, 7.VI.1970, M. Miyake (TKC); 1♀, same except 18.VI.1978, T. Kondo (TKC); 1♀, Myoren-keikoku, Kawakami-mura, 24. V.1964, H. Shigei (TKC); 1♂, Doyo, Shinjo-mura, 30.V.1970, T. Kondo (TKC); 1♂, same except 18.VI.1978 (TKC); 1♂, Tanami, Shinjo-mura, 29.V.1971, T. Kondo (TKC). Hiroshima Pref.: 1♀, Mt. Hiba, 31.V.1981, S. Nakamura (NSMT); 1♀, Mt. Yagunimi, 31.V.1987, S. Nakamura (NSMT). Yamaguchi Pref.: 1♀, Saba-gun, Namera, 2.VI.1974, K. Tanaka (NSMT); 1♂, Kuga-gun, Nishiki-cho, Mt. Jakuchi-san, 22.V.1994, K. Tanaka (NSMT). SHIKOKU: Tokushima Pref.: 8♂, Minokoshi, 1500 m, 33°52′N134°05′E, Tsurugisan Mts., 5. VI. 2003, A. Shinohara (NSMT); 2♀18♂, Kasutorisawa, 1250 m, 33°52′N134°03′E, Tsurugisan Mts., 6. VI. 2003, A. Shinohara (NSMT); 3♂, same except T. Kurihara (NSMT); 41♂, Meotoike, 1400 m, 33°52′N134°04′E, Tsurugisan Mts., 6–7. VI. 2003, A. Shinohara (NSMT); 1♀, Koya-daira-mura, Mima-gun, 4. VII. 2004, H. Takahashi (NSMT). Ehime Pref.: 1♀, Komenono, Matsuyama, 2.VII.1978, M. Kotani (EU); 1♂, Odamiyama, 10. VI. 1984, E. Yamamoto (NSMT); 70♂, Nanokawagoe, 1450 m, 33°45′N133°09′E, Tsuchigoya, Ishizuchiyama Mts., 2–4. VI. 2003, A. Shinohara (NSMT); 65♂, same except 8–10. VI. 2005 (NSMT); 1♀, "Saijo c., Tsuchigoya", 13.VI.2002, R. Matsumoto (OMNH); 1♀, Ishizuchi-yama, Saijo-shi, 7.VI.1998, M. Shiraishi (NSMT); 1♀, Mt. Higashi-akaishi-yama, Besshiyama-mura, 23. VII. 2000, M. Shiraishi (NSMT). KYUSHU: Fukuoka Pref.: 8♂, Buzenbo, Mt. Hikosan, 10.V.1986, A. Shinohara (NSMT); 7♂, same except 13.V.1986 (NSMT); 15♂, Mt. Hikosan, 21.V.1981, M. Kotani (NSMT). Kumamoto Pref.: 5♀3♂, Mt. Kuradake, ca. 1000 m, 17.V.1997, A. Shinohara (NSMT); 1♀, same except 20.V.1997 (NSMT). Oita Pref.: 1♀, Mt. Sobo, 4. VII. 1937, S. Issiki (OPU); 1♀35♂, Mt. Kurodake, Kujusan Mts., 16–24.V.1986, A. Shinohara (NSMT); 1♀, same except M. Abe (NSMT); 2♀1♂, Mt. Kurodake, 900–1100 m, Kujusan Mts., 18–19.V.1997, A. Shinohara (NSMT); 1♂, Chojabaru, Kuju, 14–15.V.1986, A. Shinohara (NSMT); 1♀, Handa-kogen, 1100 m, 26.V.1963 (NSMT). Miyazaki Pref.: 1♀, Kobayashi, Ippon-sugi-dani, 7. V. 2005, T. Saigusa (OMNH); 1♀, Lake Oohatanoike, Mt. Kirishimayama, 9. VI. 1964, A. Tanaka (KSU). Miyazaki/Kagoshima Prefs.: 1♀, Mt. Kirishima, 26. V. 1966, K. Kushigemachi (KSU). Unknown localities: 1♀, Y. Nozawa [possibly in Yamagata Pref.], 2. VI. 1978, K.S. (NSMT); 1♀, no data (NSMT).

Host plant. Acer mono Maxim. (see Okutani, 1959; Shinohara & Okutani, 1983).

Remarks. From the other species of the *komonensis* complex, *P. takeuchii* will be distinguished by the characters given in the key. Among the other species of *Pamphilius* from Japan, the female of *P. takeuchii* will be recognized by the smooth, mostly glabrous and usually largely orange head with strongly convex frons and facial crests, the long 1st antennal flagellar segment, presence of the dark cloud in the apical 1/3 of the forewing, the bicolored stigma, and the largely orange abdomen, and the male by the smooth, mostly glabrous head with very strongly convex upper frons and the sharply carinate facial crests, the long 1st antennal flagellar segment, the mostly pale yellow ventral side of the thorax and abdomen, and presence of the orange marks on the dorsal side of the abdomen.

As discussed above, this species is distributed widely in Japan and occurs from lowlands to higher mountains. Details of the biology are still unknown but its peculiar screw-like larval leaf-roll on *Acer mono* has been recorded (Shinohara & Hara, 2005).

Pamphilius croceus Shinohara, 1986

(Figs. 1K–L, 3K–L, 8, 10G, 11F, 16F, 19, 20C)

Pamphilius takeuchii: Beneš, 1974: 304 (in part).
Pamphilius croceus Shinohara, 1986: 425; Shino-

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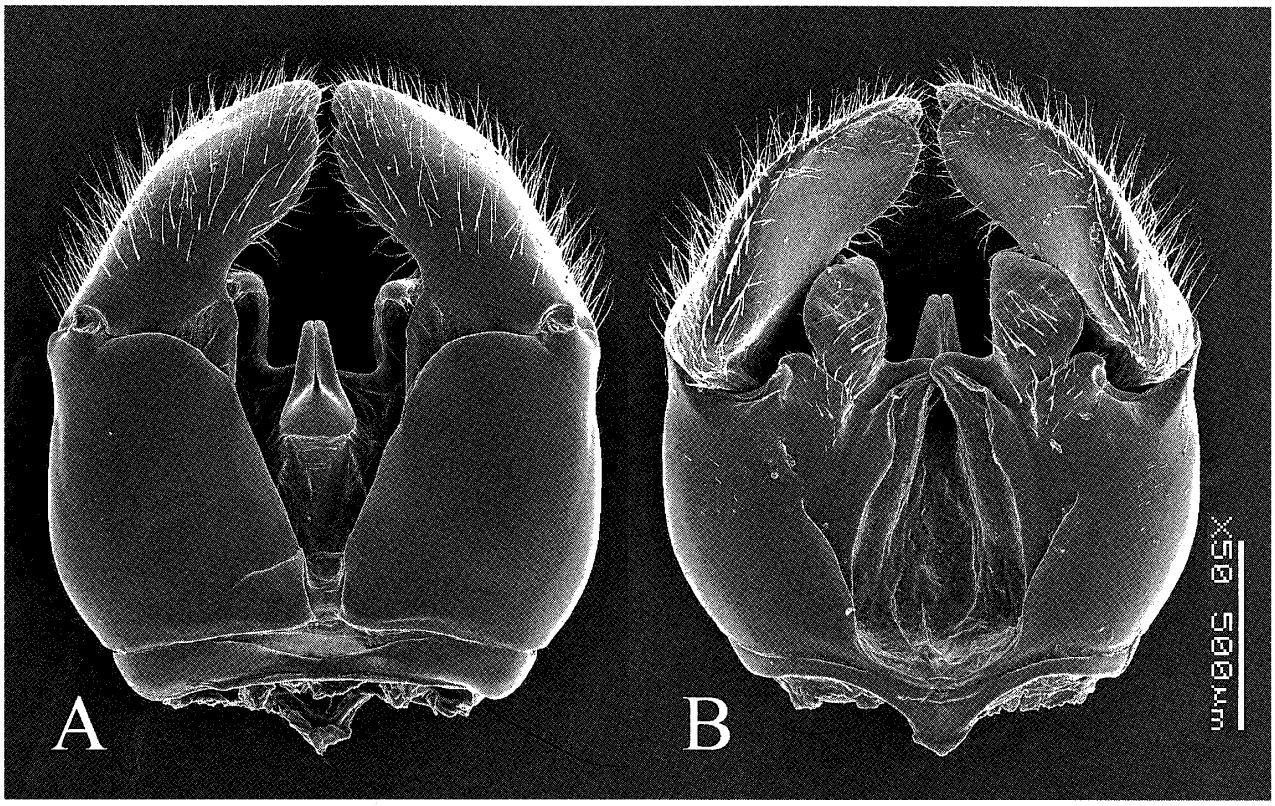

Fig. 19. *Pamphilius croceus*, male genitalia, Mt. Odaesan, Korea.

hara, 1991: 56; Kim *et al.*, 1994: 217; Zhelochovtsev & Zinovjev, 1995: 397; Shinohara, 2002a: 424; Shinohara, 2004: 263.

Female. Length 13–14.5 mm. Head pale orange, with clypeus and malar space pale yellow (Fig. 16F); upper frons strongly swollen, with rather shallow but distinct median notch, without distinct punctures; facial crest strongly inflated, carinate, and continuous to ridge on inner orbit. Antenna yellow, with flagellar segments beyond 16th–20th blackish; 1st flagellar segment about 2.3–2.5×length of 2nd (n=3). Mandible pale orange; right mandible with incision between apical and middle teeth about as deep as incision between middle and basal teeth, inner lobe of basal tooth rounded; left mandible with distinct middle tooth. Pronotum, cervical sclerite, mesonotum, metanotum, and metapleuron predominantly or entirely dark orange; mesopleuron black with dark orange marks or almost entirely dark orange. Tarsal claws with angled basal lobe. Forewing slightly yellowish with veins pale yellowish in basal 3/5 and distinctly brownish with veins dark brown in apical 2/5; entire stigma pale yellowish; cell C glabrous. Abdomen orange, with apex (usually 6th and more posterior segments) black. Sawsheath as in Fig. 10G.

Male. Length 11–13 mm. Supraocular stripe absent, at most small obscure supraocular spot present; upper frons very strongly swollen, without distinct punctures, entirely glabrous; facial crest very strongly convex, carinate, glabrous. Antenna pale yellow, becoming dark brown towards apex; basal flagellar segments not blackish; 1st flagellar segment about 2.2–2.7×length of 2nd (n=5). Mandibles pale yellow, rufous at apex, without black marks; right mandible with incision between apical and middle teeth, rather shallow, at most as deep as incision between middle and basal teeth; left mandible with distinct middle tooth. Mesoscutal median and lateral lobes entirely black or with brownish marking; mesoscutellum and metascutellum mostly pale yellow; ventral side of thorax pale yellow. Forewing distinctly blackish brown; stigma pale

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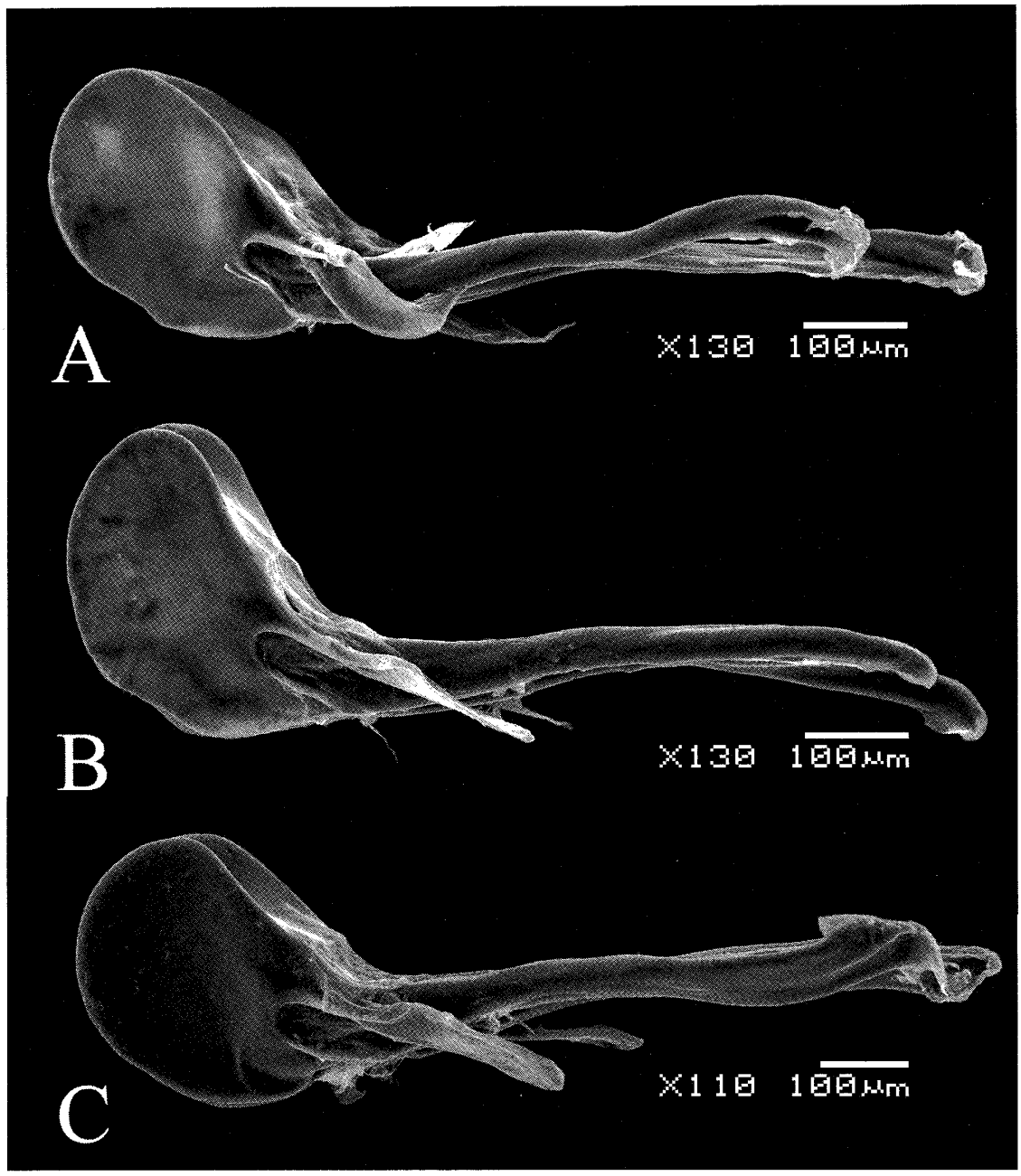

Fig. 20. *Pamphilius* spp., penis valves, lateral view.—A, *P. uniformis*, Mt. Taibaishan, Shaanxi, China; B, *P. takeuchii*, Mt. Ishizuchiyama, Japan; C, *P. croceus*, Mt. Odaesan, Korea.

brown, posteroapical part blackish; cell C glabrous, rarely partly pilose. Dorsal side of abdomen black, usually with narrow lateral margins pale yellow and 4th and 5th segments mostly orange; ventral side entirely pale yellow. Apex of subgenital plate narrowly truncate. Genitalia as in Figs. 19, 20C.

Distribution. Russia (Primorskij kraj); Korea (Fig. 8).

Type material examined. Holotype: ♀, "Dol. r. Kamenki, Suchan, Prim. o. Berger, 25.VII.914" "*Pamphilius takeuchii* n. n. ♀, det. Beneš, 1972" "Holotype, *Pamphilius croceus* n. sp., det. A. Shinohara, 1986" (NRS).

Other material examined (2♀5♂). RUSSIA (Primorskij kraj): 1♀, Spassk, 11.VI.1961, A. N. Zhelochovtsev (MU); 1♂, Suputinsk. Zapov., ot. A. Rasnitsina (MU). KOREA: 1♀, Kwangnung [in Kyonggi-do], 10.VI.1973, Kim Hyong Mun (SNU); 1♂, Huibang-sa, 750 m, Mt. Sobaek-san,

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Kyongsangbuk-do, 18.V.1987, A. Shinohara (NSMT); 1♂, Mirugam (Pukdae-sa), 1300 m, Mt. Odae-san, Kangwon-do, 10.VI.1987, A. Shinohara (NSMT); 1♂, same except 6.VI.1996 (NSMT); 1♂, same except 28.V.2002 (NSMT).

Host plant. Unknown.

Remarks. *Pamphilius croceus* is a large species separated from the other members of the *komonensis* complex by the features given in the key. In coloration, it may resemble the Eurosiberian species *P. betulae* (Linnaeus, 1758) and *P. festivus* Pesarini & Pesarini, 1984, both belonging to the *histrio* group. These two closely related species differ from *P. croceus* in the shorter 1st flagellar segment and the large inner tooth of the tarsal claws, as well as in the entirely black mesothorax, metathorax, and sawsheath in the females and in the mostly orange dorsum of the abdomen in the males.

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